Program & Abstracts

46th Vietnam Conference on Theoretical Physics

HỘI NGHỊ VẬT LÝ LÝ THUYẾT VIỆT NAM LẦN THỨ 46

Hà Nội

4-6 October 2021

Program & Abstracts

46th Vietnam Conference on Theoretical Physics

Hà Nội, Việt Nam

4-6 October 2021

Contents

Welcome Message

It is a great pleasure to welcome you in the *46th Vietnam Conference on Theoretical Physics* (VCTP-46).

The VCTP-46 is organized by the Institute of Physics, Vietnam Academy of Science and Technology (IOP-VAST) under the auspices of the Vietnam Theoretical Physics Society (VTPS).

The VCTP, formerly known as NCTP, has been an annual activity of VTPS since 1976. The VCTP is aimed to be an international conference for physicists in Vietnam, in the region and worldwide. Our mission is to foster scientific exchanges and to promote a high-standard level of research and education in Vietnam and in South East Asia.

This year, the VCTP conference is participated by 138 participants. 13 invited talks, 24 oral and 79 poster contributions will be presented. Due to the Covid-19 pandemic, the conference is held fully online.

We wish you enjoy the scientific atmosphere at this conference.

The Organizing Committee

Committees

Organizer

- Institute of Physics, Vietnam Academy of Science and Technology (IOP-VAST)

Honorary Chair

- Nguyen Van Hieu (Vietnam Academy of Science and Technology)

Chair

- Bach Thanh Cong (VNU University of Science, Hanoi)

Organizing Committee

- Trinh Xuan Hoang (Institute of Physics, VAST), Chair
- Dinh Nguyen Dinh (Institute of Physics, VAST)
- Hoang Anh Tuan (Institute of Physics, VAST)

Program Committee

- Tran Minh Tien (Institute of Physics, VAST), Chair
- Phung Van Dong (Phenikaa University)
- Le Van Hoang (Ho Chi Minh City Pedagogical University)
- Nguyen The Toan (VNU University of Science, Hanoi)
- Vu Ngoc Tuoc (Hanoi University of Science and Technology)

Secretariat

- Duong Thi Man (Institute of Physics, VAST)

Sponsor

- International Centre of Physics (ICP), Institute of Physics, Vietnam Academy of Science and Technology —*The Category 2 Centre under the auspices of UNESCO*
- Asia Pacific Center for Theoretical Physics (APCTP)

General Information

Conference venue

The VCTP-46 conference takes place online. The conference organizer, the Institute of Physics, VAST, is based in Hanoi, Vietnam.

Instructions for online participation

- Online participation takes place in Zoom/Microsoft Meeting/Google Meet platforms.
- The link for each session will be posted on the program page of the conference website.
- All online presenters must join the online session before the session starts.
- The online sessions are coordinated by session chairs.
- Poster presenters must upload the PDF files of their posters to the conference website before the conference dates.
- Poster presenters will be asked by the poster session chair to show up online to answer questions of other participants.

Instructions for speakers

The duration of an invited talk is 30 minutes. This includes 25 minutes for the presentation itself and 5 minutes for Q&A. The duration of a regular presentation is 20 minutes. This includes 17

minutes for presentation itself and 3 minutes for Q&A. We would appreciate it if all presenters can adhere strictly to these time limits.

Instructions for posters

Poster should be prepared as one page of size A0 (841 mm x 1189 mm) in portrait (vertical) mode. At least, the corresponding author of the poster should be present during the poster session. A PDF file of the poster of size less than 5 MB must be uploaded to the conference website before the conference dates. Please follow the instructions on the conference website on how to present your poster online.

VTPS Meeting

An online meeting of the Vietnamese Theoretical Physics Society (VTPS) will be held on the first day of the conference.

Time: 17:30 PM - 18:30 PM, Monday, 4 October 2021.

VTPS Young Research Award

At the opening session of the VCTP-46 conference, there will be an announcement of the winners of the 2021 VTPS Young Research Award.

Program timetable

Time	Monday, 4 October	Tuesday, 5 October	Wednesday, 6 October
08:30 – 10:00	Opening (8:30) VTPS Young Research Award Tran Chien Thang (I.1) Ho Quoc Duy (I.2) Photo Session *(Chair: Bach Thanh Cong)*	Poster Session 1 *(Chair: Hoang Anh Tuan)*	Poster Session 2 *(Chair: Nguyen Hong Quang)*
10:00 – 10:30	Coffee break	Coffee break	Coffee break
10:30 – 12:00	Cao Hoang Nam (I.3) Do Quoc Tuan (O.1) Tran Quang Loc (O.2) Ngo Hai Tan (O.3) *(Chair: Le Duc Ninh)*	Nguyen Quang Hung (I.6) Le Dai Nam (O.10) Tran Thi Nhan (O.11) Nguyen Van Hong (O.12) *(Chair: Nguyen Toan Thang)*	Dao Vong Duc (I.9) Le Duc Ninh (O.19) Dao Thi Nhung (O.20) Vo Minh Truong (O.21) *(Chair: Hoang Ngoc Long)*
12:00 – 14:00	Lunch	Lunch	Lunch
14:00 – 15:30	Nguyen Thi Kim Thanh (I.4) Tran Quang Huy (O.4) Le Thu Lam (O.5) Nguyen Duy Khanh (O.6) *(Chair: Vu Ngoc Tuoc)*	Phan Thi Ngoc Loan (I.7) Trieu Doan An (O.13) Nguyen Van Duy (O.14) Nguyen Ba Phi (O.15) *(Chair: Le Van Hoang)*	Truong Minh Duc (I.10) Nguyen Cong Ha (O.22) Ho Sy Chuong (O.23) Cao Thi Bich (O.24) *(Chair: Nguyen Ba An)*
15:30 – 16:00	Coffee break	Coffee break	Coffee break
16:00 – 17:30	Hoang Hai (I.5) Tran Thi Minh Thu (O.7) Pham Thi Ngoc Han (O.8) Lai Thi Thu Hien (O.9) *(Chair: Trinh Xuan Hoang)*	Trinh Thi Ngoc Gia (I.8) Tran Viet Nhan Hao (O.16) Le Tan Phuc (O.17) Nguyen Le Anh (O.18) *(Chair: Nguyen Quang Hung)*	Nguyen Viet Hung (I.11) Nguyen Hai Chau (I.12) Nguyen Hai Son (I.13) *(Chair: Do Van Nam)*
	VTPS Meeting		Closing

Conference Program

Monday, 4 October 2021

Opening Session
Chair: Bach Thanh Cong, Trinh Xuan Hoang

08:30 - 08:40 Opening

08:40 - 08:50 Announcement of 2021 VTPS Young Research Award

08:50 - 09:20 I.1 – Invited
Form-factor-independent test of lepton flavor universality in semileptonic heavy meson and baryon decays
Tran Chien Thang (HCMC University of Technology and Education)

09:20 - 09:50 I.2 – Invited
Xác định nguồn gốc quang phổ phát xạ và tương tác hyperfine trong β-Ga2O3 bằng hàm lai tối ưu
Hồ Quốc Duy (Can Tho University of Engineering and Technology)

09:50 - 10:00 Photo Session

10:00 - 10:30 Coffee break

Oral Session: *Particle Physics and Cosmology*
Chair: Le Duc Ninh

10:30 - 11:00 I.3 – Invited
The hierarchy problem and inflation in fiber fabric of spacetime
Cao Hoang Nam (Phenikaa University)

11:00 - 11:20 O.1 – Oral
On a viable anisotropic power-law k-inflation model
Do Quoc Tuan (Phenikaa University)

11:20 - 11:40 O.2 – Oral
Is the Standard Model in the Swampland? - Consistency requirements from gravitational scattering
Tran Quang Loc (DAMTP, University of Cambridge)

11:40 - 12:00 O.3 – Oral
Equation of state of asymmetric nuclear matter and the tidal deformability

of neutron star
Ngô Hải Tân (Phenikaa University)

12:00 - 14:00 Lunch

Oral Session: *Condensed Matter Physics*
Chair: Vu Ngoc Tuoc

14:00 - 14:30 I.4 – Invited
Thermoelectrics of a two-channel charge Kondo circuit: role of electron-electron interactions in a quantum point contact
Nguyen Thi Kim Thanh (Institute of Physics, Vietnam Academy of Science and Technology)

14:30 - 14:50 O.4 – Oral
First-principles study on the absorption of aceton, ethanol, and propanal on WS2 monolayer
Tran Quang Huy (Hanoi Pedagogical University 2)

14:50 - 15:10 O.5 – Oral
Effect of temperature on electrical property of Ceria based electrolytes by doping Samaria and Gadolinia
Le Thu Lam (Tay Bac University)

15:10 - 15:30 O.6 – Oral
Feature-Rich Electronic Properties of Carbon-Doped Silicene Nanoribbons: A First-Principles Investigations
Nguyen Duy Khanh (Thu Dau Mot University)

15:30 - 16:00 Coffee break

Oral Session: *Soft Matter and Biological Physics*
Chair: Trinh Xuan Hoang

16:00 - 16:30 I.5 – Invited
Thermodiffusion in Simple Binary Mixtures: Theoretical Models and Molecular Simulations
Hoàng Hải (Institute of Fundamental and Applied Sciences, Duy Tan University)

16:30 - 16:50 O.7 – Oral
Nanomechanical Stability of Aβ Tetramers and Fibril-like Structures: Molecular Dynamics Simulations
Tran Thi Minh Thu (University of Science)

16:50 - 17:10 O.8 – Oral
Estimating Potential Inhibitors for AChE and SARS-CoV-2 Main Protease using Machine Learning, Molecular Docking, and Molecular Dynamics Simulations
Pham Thi Ngoc Han (Faculty of Pharmacy, Ton Duc Thang University, Ho Chi Minh City, Vietnam)

17:10 - 17:30 O.9 – Oral

Investigating structural differences of the SARS-CoV-2 Mpro binding site before and after covalent bond formation with ligands: enabling efficient and accurate virtual screening campaigns.

Lai Thi Thu Hien (Hanoi University of Science)

17:30 - 18:30 VTPS Meeting

Tuesday, 5 October 2021

Poster Session 1
Chair: Hoang Anh Tuan

08:30 - 10:00 P.1 – Poster

Phonon-drag thermopower magnetoquantum oscillations in a monolayer WS_2

Trần Ngọc Bích (Quang Binh University, University of Education, Hue University)

08:30 - 10:00 P.2 – Poster

Half-wormhole solutions & Black Hole singularity

Tran Quang Loc (DAMTP, University of Cambridge)

08:30 - 10:00 P.3 – Poster

Theoretical investigation of diffusion and electrical properties of yttria-stabilized zirconia thin film

Le Thu Lam (Tay Bac University)

08:30 - 10:00 P.4 – Poster

Generation of multimode entangled states via projection operation

Tran Quang Dat (University of Transport and Communications)

08:30 - 10:00 P.5 – Poster

Characterizing the octant resolving of mixing angle θ_{23} in the neutrino oscillation and the impact to the CP violation measurement

Phan To Quyen (IFIRSE, ICISE)

08:30 - 10:00 P.6 – Poster

Electric field as a novel switch to control the magnetization and optical absorption spectra of defect blue phosphorene thin-films

Nguyen Thi Bao Trang (Can Tho University)

08:30 - 10:00 P.7 – Poster

Opto-electronic and vibrational properties of Nitrogen doped hexagonal-graphene quantum dots: A first principles study

Nguyen Vo Anh Duy (Can Tho University)

08:30 - 10:00 P.8 – Poster

Absorption mechanism of Monolayer MoSe2 towards Aldehyde Volatile Organic Compounds

Tran Quang Huy (Hanoi Pedagogical University 2)

08:30 - 10:00 P.9 – Poster

Novel imprint of a vector doublet

Phung Van Dong (Phenikaa University)

08:30 - 10:00 P.10 – Poster

Mass spectrum of Higgs bosons in the 331ISS model, with the identification of neutral Higgs with the corresponding ones in THDM.

Ha Thanh Hung (Hanoi Pedagogical University 2)

08:30 - 10:00 P.11 – Poster

Some Essential Properties of Germanene Nanoribbons Under Potassium Doping Effect: A DFT Study

On Van Vo (Thu Dau Mot University)

08:30 - 10:00 P.12 – Poster

Magnetic topological phases in the spinful Haldane model with spin exchange

Tran Thi Thanh Mai (Hanoi National University of Education)

08:30 - 10:00 P.13 – Poster

Magnetic phases in kagome magnets: dynamical mean field study

Nguyễn Hồng Sơn (Trường Đại học Công đoàn)

08:30 - 10:00 P.14 – Poster

Entropy Scaling for Viscosity of Lennard-Jones Binary Mixtures

Nguyễn Phúc (The Institute of Fundamental Science and Application)

08:30 - 10:00 P.15 – Poster

Gas adsorption properties (N2, H2, O2, NO, NO2, CO, CO2, SO2, H2S, H2O and NH3) of the O-vacancy-containing monolayer Sc2CO2: a first-principles study

Phạm Dinh Khang (Military Institute of Mechanical Engineering)

08:30 - 10:00 P.16 – Poster

Free-carrier screening in cylindrical quantum wires: Effect of dielectric mismatch and finite confinement potential

Nguyễn Như Đạt (Đại học Duy Tân)

08:30 - 10:00 P.17 – Poster

Influence of temperature on the lattice constant of SrTiO3 perovskite by the statistical moment method with improved interatomic potential.

Cao Huy Phương (Hung Vuong University)

08:30 - 10:00 P.18 – Poster

Stability of even-to-odd ratio to laser intensity and wavelength

Nguyen Thi Hien (Department of Physics, Tay Nguyen University)

08:30 - 10:00 P.19 – Poster

The resonance of the quantum Peltier coefficient in a parabolic quantum well

of GaAs/GaAsAl in the case of confined optical phonon
Nguyễn Thị Lâm Quỳnh (VNU University of Science)

08:30 - 10:00 P.20 – Poster
Magnon spectrum of the spin-1 J1 –J2 antiferromagnetic Heisenbeberg model on a triangular lattice
Nguyen Van Hinh (Hanoi University of Industry)

08:30 - 10:00 P.21 – Poster
Investigation of thermodynamic quantities in some excited nuclei
Le Thi Quynh Huong (University of Khanh Hoa)

08:30 - 10:00 P.22 – Poster
Tomography of partially aligned molecules
Trần Công Minh (Ho Chi Minh City University of Education)

08:30 - 10:00 P.23 – Poster
Multiple rescatterings in harmonic spectra in multicycle midinfrared lasers
Le Thi Cam Tu (Ton Duc Thang University)

08:30 - 10:00 P.24 – Poster
Numerical calculation of the dependence of the chemical potential on temperature for ideal quantum gases in 1, 2, and 3-dimensional spaces
Pham Nguyen Thanh Vinh (Ho Chi Minh City University of Education)

08:30 - 10:00 P.25 – Poster
Investigate ALP binding mechanism to allele HLA-A*33:03 using Molecular Dynamic simulation
Tran Ba Duong (VNU Key Laboratory)

08:30 - 10:00 P.26 – Poster
Study the P-V-T equation of state of copper up to high temperature and pressure
Pham Duy Tan (Research Department, Tank Armour Command)

08:30 - 10:00 P.27 – Poster
Calculation of the acoustomagnetoelectric field in a doped semiconductor superlattice under the influence of an intense electromagnetic wave
Nguyễn Quyết Thắng (Faculty of Physics, VNU University of Science)

08:30 - 10:00 P.28 – Poster
A new Development for Prediction of Covid-19 Pandemics
Chu Thuy Anh (Institute of physics, VAST)

08:30 - 10:00 P.29 – Poster
Effect of ATP and Colchicine ligands on the NLRP3 – NACHT protein domain
Lai Thi Thu Hien (Hanoi University of Science)

08:30 - 10:00 P.30 – Poster
Study of SARS-CoV-2 main protease – X77 interaction at molecular scale

using Molecular Dynamics Simulation
Tran Ba Duong (VNU Key Laboratory)

08:30 - 10:00 P.31 – Poster
Entanglement dynamics of a two-mode Jaynes-Cummings model interacting with the superposition of photon-added pair coherent states
Le Thi Hong Thanh (Quang Nam university)

08:30 - 10:00 P.32 – Poster
Bundle arrangement in toroidal structures of a stiff-polymer chain
Nguyen Thi Thuy Nhung (Institute of Physics, VAST)

08:30 - 10:00 P.33 – Poster
Examination of α-induced fusion reactions relevant to the production of p-nuclei
Nguyen Nhu Le (Physics Department, University of Education, Hue University)

08:30 - 10:00 P.34 – Poster
Extracting component ratio of HCN-HNC isomers mixing from high-order harmonic generation
Truong Quan Hao (Ho Chi Minh city University of Education)

08:30 - 10:00 P.35 – Poster
Empirically extracted entropy and heat capacity of heated rotating nuclei
Tran Dong Xuan (Institute of Fundamental and Applied Sciences (IFAS), Duytan University (DTU))

08:30 - 10:00 P.36 – Poster
Taget-dependent of high-order harmonic generation from atoms in chirp laser pulse
Nguyen Thanh Tu (Ho Chi Minh City University of Education)

08:30 - 10:00 P.37 – Poster
Magnetic and electric dipole moments in a TeV scale type-I see-saw model
Dinh Nguyen Dinh (Institute of Physics, Hanoi)

08:30 - 10:00 P.38 – Poster
Investigation of R_K and R_K^* anomalies in the minimal flipped 3-3-1 model
Nguyen Tuan Duy (Institute of Physics)

08:30 - 10:00 P.39 – Poster
Dark matter in the fully flipped 3-3-1-1 model
Duong Van Loi (Phenikaa University)

08:30 - 10:00 P.40 – Poster
Diverse Electronic and Magnetic Properties of Fluorine-Adsorbed Silicene Nanoribbons: A Density Functional Theory Study
Vo Tien Dat (Truong Xuan High School)

10:00 - 10:30 Coffee break

Oral Session: *Condensed Matter Physics*
Chair: Nguyen Toan Thang

10:30 - 11:00 I.6 – Invited
A hybrid model for estimation of pore size from ortho-positronium lifetimes in porous materials
Nguyễn Quang Hưng (Institute of Fundamental and Applied Sciences, Duy Tan University)

11:00 - 11:20 O.10 – Oral
Orbital magnetization in axially symmetric two-dimensional carbon allotrope: influence of electric field and geometry
Le Dai-Nam (Atomic Molecular and Optical Physics Research Group, Advanced Institute of Materials Science, Ton Duc Thang University)

11:20 - 11:40 O.11 – Oral
Aldehyde Gas Absorption on Monolayer WSe_2
Trần Thị Nhàn (Hanoi University of Industry)

11:40 - 12:00 O.12 – Oral
Glassy network structure of CaO-SiO2 and CaO-Al2O3-SiO2 melts: insight from Molecular Dynamics Simulation
Nguyen Van Hong (Ha noi University of science and Technology)

12:00 - 14:00 Lunch

Oral Session: *Molecular Physics and Quantum Optics*
Chair: Le Van Hoang

14:00 - 14:30 I.7 – Invited
Influence of dynamic core-electron polarization of co molecules on odd-even high-order harmonic generation
Phan Thi Ngoc-Loan (Ho Chi Minh City University of Education)

14:30 - 14:50 O.13 – Oral
Effect of static electric field on odd-even high-order harmonic generation
Trieu Doan An (Ho Chi Minh City University of Education)

14:50 - 15:10 O.14 – Oral
Practical quantum computation of ground state energy level using full quantum eigensolver method
Nguyen Van Duy (Phenikaa University)

15:10 - 15:30 O.15 – Oral
Mobility edges in quasiperiodic mosaic lattice chains: A reflection geometry-based numerical study
Nguyen Ba Phi (Mientrung University of Civil Engineering)

15:30 - 16:00 Coffee break

Oral Session: *Nuclear and Astro- Physics*
Chair: Nguyen Quang Hung

16:00 - 16:30 I.8 – Invited
Study on radio emission from extensive air showers by using MGMR3D
Trịnh Thị Ngọc Gia (Can Tho University)

16:30 - 16:50 O.16 – Oral
Effects of momentum-density dependent terms of the effective Skyrme interaction on neutron elastic scattering observables
Tran Viet Nhan Hao (University of Education, Hue University)

16:50 - 17:10 O.17 – Oral
Pairing reentrance in odd nuclei
Le Tan Phuc (Duy Tan University)

17:10 - 17:30 O.18 – Oral
Self-consistent mean-field description of nucleon radiative capture reactions in nuclear astrophysics
Nguyen Le Anh (Department of Physics, Ho Chi Minh City University of Education)

Wednesday, 6 October 2021

Poster Session 2
Chair: Nguyen Hong Quang

08:30 - 10:00 P.41 – Poster
Temperature effect on exciton energy spectra of transition-metal dichalcogenides monolayers
Ly Duy-Nhat (Ho Chi Minh City University of Education)

08:30 - 10:00 P.42 – Poster
Topological phases in kagome magnets
Nguyễn Hồng Sơn (Trường Đại học Công đoàn)

08:30 - 10:00 P.43 – Poster
Charged excitons or trions in 2D parabolic quantum dots
Nguyễn Hồng Quang (Institute of Physics, VAST)

08:30 - 10:00 P.44 – Poster
The second–order correction of the energy of one-dimensional harmonic oscillator influenced by position-dependent perturbed potentials
Pham Nguyen Thanh Vinh (Ho Chi Minh City University of Education)

08:30 - 10:00 P.45 – Poster
Cylindrical quantum wire : the Quantum photo-stimulated Peltier effect under the influence of confined acoustic phonons.
Nguyễn Thị Nguyệt Ánh (VNU University of Science)

08:30 - 10:00 P.46 – Poster

The decay of the standard model-like Higgs boson $h \to Z\gamma$ in a G221 model

Nguyen Thi Tham (Hanoi Pedagogical University No2)

08:30 - 10:00 P.47 – Poster

Controlling the nonsequential double ionization process of argon atom induced by the orthogonal two-color laser pulse

Truong Dang Hoai Thu (Ho Chi Minh city University of Education)

08:30 - 10:00 P.48 – Poster

Boundary-scattering induced Seebeck coefficient enhancement in thin films within relaxation time approximation

Bach Huong Giang (VNU University of Science)

08:30 - 10:00 P.49 – Poster

Explore the application of reactor neutrino detector to the nuclear safeguard in Vietnam

Trần Văn Ngọc (IFIRSE, ICISE)

08:30 - 10:00 P.50 – Poster

Formation of Two-Dimensional Amourphous hexa Boron nitride by MD simulation

Nguyen Hoang Giang (Đại học Bách khoa-ĐHQG Tp HCM)

08:30 - 10:00 P.51 – Poster

Improving of H_2 adsorption via optimized tuning local structure and charge distribution in metal-organic framework Zn-based MOF-74 by Ca doping

Nguyen Thuy Trang (Faculty of Physics, VNU University of Science)

08:30 - 10:00 P.52 – Poster

Dispersion relations in biased bilayer graphene double-layer structures

Nguyễn Văn Mện (An Giang University - VNU HCM)

08:30 - 10:00 P.53 – Poster

Bound states of (2 + 1)-dimensional massive Dirac fermions in a Lorentzian-shaped inhomogeneous perpendicular magnetic field

Le Dai-Nam (Atomic Molecular and Optical Physics Research Group, Advanced Institute of Materials Science, Ton Duc Thang University)

08:30 - 10:00 P.54 – Poster

Structure and Electronic Properties of Germanene Nanoribbons Under Sodium Doping Effect: A DFT Study

On Van Vo (Thu Dau Mot University)

08:30 - 10:00 P.55 – Poster

Nonperturbative Casimir effect of compact electrodynamics in 2+1 dimensions

NGUYEN Huu Ha (Dalat University)

08:30 - 10:00 P.56 – Poster

Screening AChE-Inhibitor Vina Docking and SMD simulations
Thai Quynh Mai (Faculty of Pharmacy, Ton Duc Thang University)

08:30 - 10:00 P.57 – Poster
In silico screening of potential β-secretase (BACE1) inhibitors from VietHerb database
Nguyen Thao Nhung (NTT Hi-Tech Institute, Nguyen Tat Thanh University)

08:30 - 10:00 P.58 – Poster
Significant enhancement of optical absorption of a monolayer graphene inside an optical microcavity
Nguyen Duy Vy (Ton Duc Thang University)

08:30 - 10:00 P.59 – Poster
Ab-initio Calculations of Water Adsorption on Graphene: The role of the Substrate Materials
Phung T. V. Bac (VNU Vietnam Japan University)

08:30 - 10:00 P.60 – Poster
Probing the permanent dipole moment of polar molecule from high-oder harmonic generation
Nguyen Huynh Kim Ngan (Ho Chi Minh City University of Education)

08:30 - 10:00 P.61 – Poster
Magnetic excitations in the S=1 two-dimensional Kitaev-Heisenberg model
Pham Thi Thanh Nga (Thuy loi University)

08:30 - 10:00 P.62 – Poster
$Na_2V_3(SO_4)_4$ - a promising cathode material of SIB batteries
Trần Thiện Lân (Hue University of Education, Hue University)

08:30 - 10:00 P.63 – Poster
Topological Green function of interacting systems
Tran Thi Thanh Mai (Hanoi National University of Education)

08:30 - 10:00 P.64 – Poster
Enhancing absorption of graphene layer using an optical microcavity graphene
Le Tri Dat (Ton Duc Thang University)

08:30 - 10:00 P.65 – Poster
Partial level scheme of ^{182}Ta obtained from ^{181}Ta(n,2γ) experiment: preliminary results
Nguyen Ngoc Anh (Dalat Nuclear Research Institute)

08:30 - 10:00 P.66 – Poster
Influence of Coulomb disorder on the phase diagram of the Anderson-Hubbard model
Nguyen Thi Hai Yen (Institute of Physics)

08:30 - 10:00 P.67 – Poster
The one-loop order contributions of the cLFV decays in 331ISS model.
Ha Thanh Hung (Hanoi Pedagogical University 2)

08:30 - 10:00 P.68 – Poster
Magnons in a monolayer honeycomb spin lattice
Nguyen Tu Niem (VNU University of Science)

08:30 - 10:00 P.69 – Poster
Oxygen vacancy induced insulator-metal transition in LaNiO3 ultrathin films
Nguyen Duy Huy (VNU University of Science)

08:30 - 10:00 P.70 – Poster
Electronic and thermoelectric properties of ZnO under the adsorption of lung cancer-related gases: first-principle study
Phan Thi Hong Hoa (Ho Chi Minh City University of Technology)

08:30 - 10:00 P.71 – Poster
Efficient Theoretical Approach for the Structural Relaxation Process of Amorphous Drugs under Various Thermodynamic Conditions
Tran Dinh Cuong (Phenikaa University)

08:30 - 10:00 P.72 – Poster
The possible coexistence of crystalline density modulation and super-fluidity with soft-core bosons in the optical lattice
Nguyen Oanh (UET)

08:30 - 10:00 P.73 – Poster
Computer simulation of glassy network structure of B2O3-2SiO2 and Al2O3-2SiO2 systems
Mai Thi Lan (Hanoi University of Science and Technology)

08:30 - 10:00 P.74 – Poster
Exact one-loop contributions to the decay $H \to \nu_l \bar{\nu}_l \gamma$
Trần Trí Dũng (HCMUS)

08:30 - 10:00 P.75 – Poster
Charge-mass formula for gauge bosons
Dao Vong Duc (Institute of Physics, VAST)

08:30 - 10:00 P.76 – Poster
Study the melting temperature of copper and silver up to high pressure
Pham Duy Tan (Research Department, Tank Armour Command)

08:30 - 10:00 P.77 – Poster
Study of the dynamics of amyloid formation using a Go-like model
Trinh Xuan Hoang (Institute of Physics, VAST)

08:30 - 10:00 P.78 – Poster
Full next-to-leading order QED prediction for electron muon elastic scattering

Lê Văn Cường (Institute For Interdisciplinary Research in Science and Education, ICISE)

08:30 - 10:00 P.79 – Poster

Anderson localization on the Anderson-Hubbard model with spatially alternating interactions

Hoang Anh Tuan (Institute of Physics, VAST)

10:00 - 10:30 Coffee break

Oral Session: *Particle and Nuclear Physics*
Chair: Hoang Ngoc Long or Phung Van Dong

10:30 - 11:00 I.9 – Invited

Mass relation for unified multiplet of vector mesons in extradimensions

Dao Vong Duc (Institute of Physics, VAST)

11:00 - 11:20 O.19 – Oral

Double polarization signals in diboson productions at the LHC

Le Duc Ninh (ICISE, Quy Nhon)

11:20 - 11:40 O.20 – Oral

Two-Loop $\mathcal{O}\left(\alpha_{\sqcup} + \alpha_{\lambda} + \alpha_{\kappa}\right)^{\in}$ Corrections to the Higgs Boson Masses in the CP-Violating NMSSM

Dao Thi Nhung (IFIRSE)

11:40 - 12:00 O.21 – Oral

Calculating multipole form factors and investigating the influence of the weak interaction in e-6Li elastic scattering at high energies

Vo Minh Truong (Mien Tay Construction University)

12:00 - 14:00 Lunch

Oral Session: *Quantum Information*
Chair: Nguyen Ba An

14:00 - 14:30 I.10 – Invited

Entanglement and continuous variable quantum teleportation via two modes nonclassical states

Truong Minh Duc (Hue University of Education, Hue University)

14:30 - 14:50 O.22 – Oral

Neutrino oscillation on a superconducting qutrit processor

Nguyen Cong Ha (Nano and Energy Center, HUS, VNU/ Phenikaa Institute for Advanced Study)

14:50 - 15:10 O.23 – Oral

Sum squeezing, entanglement and quantum teleportation of the superposition of photon-added pair coherent state

Hồ Sỹ Chương (Dong Nai University)

15:10 - 15:30 O.24 – Oral

Joint remote preparation of single-photon in three degrees of freedom with two hyper-bell state pairs

Cao Thi Bich (Institute of Physics, VAST)

15:30 - 16:00 Coffee break

Oral Session: *Twistronics and Topology*
Chair: Do Van Nam or Tran Minh Tien

16:00 - 16:30 I.11 – Invited

Lattice dynamics and electronic properties of small-angle twisted bilayer graphene

Nguyen Viet Hung (Université catholique de Louvain)

16:30 - 17:00 I.12 – Invited

Magic configurations in moiré superlattice of bilayer photonic crystal

Nguyen Hai Chau (University of Siegen)

17:00 - 17:30 I.13 – Invited

The exceptional properties of non-Hermitian photonics with subwavelength optical lattices

Nguyen Hai Son (Ecole Centrale de Lyon)

17:30 - 17:40 Closing

Conference Abstracts

I.1 – Invited, VCTP-46

Form-factor-independent test of lepton flavor universality in semileptonic heavy meson and baryon decays

Tran Chien Thang

HCMC University of Technology and Education

In semileptonic decays of heavy mesons and baryons, the lepton-mass dependence factors out in the quadratic $\cos^2\theta$ coefficient of the differential $\cos\theta$ distribution. We call the corresponding normalized coefficient the convexity parameter. This observation opens the path to a test of lepton universality in semileptonic heavy meson and baryon decays that is independent of form-factor effects. By projecting out the quadratic rate coefficient, dividing out the lepton-mass-dependent factor, and restricting the phase space integration to the τ lepton phase space, one can define optimized partial rates which, in the Standard Model, are the same for all three (e, μ, τ) modes in a given semileptonic decay process. We discuss how the identity is spoiled by New Physics effects. We discuss semileptonic heavy meson decays such as $\bar{B}^0 \to D^{(*)+}\ell^-\bar{\nu}_\ell$ and $B_c^- \to J/\psi(\eta_c)\ell^-\bar{\nu}_\ell$, and semileptonic heavy baryon decays such as $\Lambda_b \to \Lambda_c\ell^-\bar{\nu}_\ell$) for each $\ell = e, \mu, \tau$.

Presenter: Tran Chien Thang

I.2 – Invited, VCTP-46

Xác định nguồn gốc quang phổ phát xạ và tương tác hyperfine trong β-Ga2O3 bằng hàm lai tối ưu

Hồ Quốc Duy

Đại học Kỹ Thuật - Công Nghệ Cần Thơ

Phương pháp lý thuyết phiếm hàm mật độ với các gần đúng LDA và GGA thường được sử dụng để tính toán cho các vật liệu, nhưng LDA/GGA cho kết quả độ rộng vùng cấm của bán dẫn nhỏ hơn nhiều so với thực nghiệm và cũng không thể mô tả chính xác mức độ định xứ của các sai hỏng. Khi độ rộng vùng cấm của bán dẫn không được tính toán chính xác từ LDA/GGA thì phương pháp hàm lai, cụ thể là HSE06 (α= 0,25 và μ = 0.20), thường được sử dụng. Tuy nhiên phường pháp hàm lai HSE06 này thường không quan tâm nhiều đến độ định xứ của hàm sóng. Do đó một hàm lai tối ưu cần được tiền hành nghiên cứu, hàm lai tối ưu này chẳng những phải cho kết quả độ rộng vùng cấm trùng khớp với kết quả thực nghiệm mà còn thoả mãn lý thuyết Koopman. Đối với vật liệu β-Ga2O3, Peter Deák cùng với tôi và các cộng sự đã nghiên cứu tìm ra hàm lai tối ưu cho vật liệu này với các thông số α= 0.26 và μ = 0.00, được gọi là HSE(0.26,0.00). Hàm lai tối ưu này không chỉ tính toán chính xác được độ rộng vùng cấm trong

thực nghiệm của β-Ga2O3 mà nó còn thoả mãn lý thuyết Koopman - đảm bảo độ chính xác trong việc tính toán độ định xứ của hàm sóng. Mức chuyển hoá năng lượng của các sai hỏng tính toán từ phương pháp tối ưu hoá hàm lai rất phù hợp với kết quả thực nghiệm. Phương pháp này tiếp tục được áp dụng cho việc xác định nguồn gốc của các quang phổ UV, xanh dương và xanh lá và các tương tác hyperfine trong vật liệu β-Ga2O3.

Presenter: Hồ Quốc Duy

I.3 – Invited, VCTP-46

The hierarchy problem and inflation in fiber fabric of spacetime

Cao Hoang Nam (1), Tran Dinh Tham (2), Nguyen Huy Thao (3), Tran Ngoc Hung (4)

(1) Phenikaa University; (2) Pham Van Dong University; (3) Hanoi Pedagogical University 2; (4) Institute of Physics

The large hierarchy between quantum gravity and electroweak scales could be resolved by proposing the large extra dimensions with the fundamental Planck scale being of the order of TeV scale. But, there would appear a new hierarchy between the inverse size of the extra dimensions and the fundamental Planck scale. In this paper, we will represent a resolution for the hierarchy problem where the inverse size of the extra dimension and the fundamental Planck scale would all be of the order of TeV scale by proposing a fiber fabric of spacetime. The origin of the large hierarchy is essentially due to the cosh function which is physically obtained from the dynamics of the horizontal metric in the vacuum of non-zero energy. In addition, the fiber fabric of spacetime allows us to resolve the problem of what to fix the size of the extra dimension in an elegant and natural way, which are usually encountered in the higher dimensional theories. Then, we explore the inflation with the modulus of the extra dimension identified as the inflaton.

Presenter: Cao Hoang Nam

I.4 – Invited, VCTP-46

Thermoelectrics of a two-channel charge Kondo circuit: role of electron-electron interactions in a quantum point contact

A. V. Parafilo (1), T. K. T. Nguyen (2), and M. N. Kiselev (3)

(1) Center for Theoretical Physics of Complex Systems, Institute for Basic Science, Expo-ro, 55, Yuseong-gu, Daejeon 34126, Republic of Korea (2) Institute of Physics, Vietnam Academy of Science and Technology, 10 Dao Tan, Hanoi, Vietnam (3) The Abdus Salam International Centre for Theoretical Physics, Strada Costiera 11, I-34151, Trieste, Italy

In this work we investigate properties of a quantum impurity model in the presence of additional many-body interactions between mobile carriers. The fundamental question which is addressed here is how the interactions in charge and spin sectors of itinerant system affect the quantum impurity physics in the vicinity of the intermediate coupling fixed point. To illustrate the general answer to this question we discuss a two channel charge Kondo circuit model. We show that the electronelectron interactions resulting in formation of a massive spin mode in the itinerant electrons sub-set drive the system away from the unstable Non-Fermi liquid (NFL) fixed point to the stable Fermi liquid (FL) regime. We discuss thermoelectric response as a benchmark for the NFL-FL crossover.

Presenter: Nguyen Thi Kim Thanh

I.5 – Invited, VCTP-46

Thermodiffusion in Simple Binary Mixtures: Theoretical Models and Molecular Simulations

Hai Hoang (1), Cuong Quoc Doan (2), Han Tuong Luc (3), Guillaume Galliero (4)

(1) Institute of Fundamental and Applied Sciences, Duy Tan University, Ho Chi Minh City, Vietnam (2) Quang Binh University, Dong Hoi City, Vietnam (3) Cao Thang Technical College, Ho Chi Minh City, Vietnam (4) Universite de Pau et des Pays de l'Adour, E2S UPPA, CNRS, TOTAL, LFCR, Pau, France

Thermodiffusion is a phenomenon observed in fluid mixtures subjected to a thermal gradient, which is composition gradients of mixture constituents due to their different responses to the force of thermal gradient [1]. This phenomenon is often described by a thermal diffusion factor or Soret coefficient [2]. Accurate estimate of this quantity is highly required not only in fundamental sciences and but also in engineering applications, so many theoretical models have been developed in literature [3]. However, their limits and capabilities have not been systematically investigated, even for simple binary mixtures. This is a main goal of present work.

To do so, using molecular simulations on model fluids, we have computed inputs of the available theoretical models and thermal diffusion factors of binary mixtures composed of species differing in terms of molecular parameters (molecular mass, molecular size, potential and shape), separately and then coupled, at various thermodynamic conditions [4]. It has been obtained that their predictions are rather limited even for these simple binary mixtures. In addition, we have also proposed a predictive model that is able to quantitatively compute the Sorect coefficient of the binary mixtures.

[1] C. Soret (1879) Arch. Sci. Phys. Nat. 2, 46. [2] W. Köhler and K. I. Morozov (2016) J. Non-Equilib. Thermodyn. 41, 151. [3] S. Srinivasan and M. Z. Saghir (2012) - Thermodiffusion in Multicomponent Mixtures: Thermodynamic, Algebraic, and Neuro-Computing Models, Springer Science & Business Media. [4] Frenkel, D. and Smit B. (2001) Understanding molecular simulation: from algorithms to applications, Second Edition, Academic Press.

Presenter: Hoàng Hải

I.6 – Invited, VCTP-46

A hybrid model for estimation of pore size from ortho-positronium lifetimes in porous materials

L. Anh Tuyen (1), T. Dong Xuan (2), H. A. Tuan Kiet (3), L. Chi Cuong (4), P. Trong Phuc (1), T. Duy Tap (5), Van-Phuc Dinh (2), L. Ly Nguyen (1), N. T. Ngoc Hue (1), P. Thi Hue (1), L. Thai Son (1), D. Van Hoang (1), N. Hoang Long (1), and N. Quang Hung (2)

(1) Center for Nuclear Techniques, Vietnam Atomic Energy Institute, Ho Chi Minh City, Viet Nam; (2) Institute of Fundamental and Applied Sciences, Duy Tan University, Ho Chi Minh City, Viet Nam; (3) Graduate School of Education, University of Pennsylvania, Philadelphia, USA; (4) University of Technical Education, Ho Chi Minh City, Viet Nam; (5) University of Science, Vietnam National University Ho Chi Minh City, Ho Chi Minh City, Viet Nam

We have proposed a novel model for estimating the free-volume size of porous materials based on the analysis of various experimental ortho-positronium (o-Ps) lifetime data. The model is derived based on the semi-classical physics model, which works in the region of large pores (pore size $R > 1$ nm), combining with the conventional Tao-Eldrup (TE) model, which is applicable only for the small-pore region ($R < 1$ nm). The proposed model, called the hybrid (HYB) model,

is able to smoothly connect the o-Ps lifetimes in the two regions of the pore. In particular, by introducing the o-Ps diffusion probability parameter, the HYB model has reproduced quite well the experimental o-Ps lifetimes in the whole region of pore sizes. It has also described very well the two defined sets of experimental o-Ps lifetimes in the pores with spherical and channel geometries. Hence, the present model is applicable for the pore size in the universal range of 0.2 - 400 nm for most of porous materials with different geometries [1]. Reference: [1] L. Anh Tuyen et al., Radiat. Phys. Chem. 172, 108867 (2020).

Presenter: Nguyễn Quang Hưng

I.7 – Invited, VCTP-46

Influence of dynamic core-electron polarization of co molecules on odd-even high-order harmonic generation

Ngoc-Loan Phan(1), Hien T. Nguyen (2), Kim-Ngan H. Nguyen (1), Cam-Tu Le (3), Van-Hoang Le (1)

(1) Ho Chi Minh City University of Education (2) Tay Nguyen University (3) Ton Duc Thang University

Recently, the investigation of high-order harmonic generation (HHG) emitted from polar molecules such as CO, NO, OCS has been paid much attention. In the difference from HHGs of atoms or symmetric molecules that contain only odd harmonics, the HHGs emitted from polar molecules possess both odd and even harmonics due to the symmetry breaking of the molecule itself [1,2]. Therefore, the quantity characterized by the ratio of the intensities between the neighboring even and odd harmonics, called the even-to-odd ratio, is substantial in probing molecular dynamics or molecular ensemble [3]. In general, most of the theories are based on the single-active electron approximation, in which only the outermost electron can be ionized and then recombined into the parent ion to emit HHG. Meanwhile, the core electrons are considered "frozen" associated with the nuclei. However, recent studies have proved the significant influence of the multielectron effect on the ionization rate, and as a consequence, the HHG intensity [4,5]. But the impact of the core-electron on the even-to-odd ratio is still desirable. This report presents the influence of dynamic core-electron polarization (DCeP) of CO molecules on the even-to-odd ratio. The HHG is theoretically simulated by numerically solving the time-dependent Schrödinger equation. We indicate that the DCeP considerably affects the even-to-odd ratio. Notably, considering the DCeP effect makes the even-to-odd ratio is compared to the experimental data. We then clarify that this influence is attributed to the effect of DCeP not only on the intensity but also the phase difference of the adjacent attosecond harmonic bursts.

[1] Frumker, E. et al. Probing Polar Molecules with High Harmonic Spectroscopy. Phys. Rev. Lett. 109, 233904 (2012). [2] Phan, N.- L., Le, C. T., Hoang, V. H. & Le, V. H. Odd-even harmonic generation from oriented CO molecules in linearly polarized laser fields and the influence of the dynamic core-electron polarization. Phys. Chem. Chem. Phys. 21, 24177–24186 (2019). [3] Phan, N.-L. et al. General characterization of partially oriented polar molecules by the time-frequency profile of high-order harmonic generation. Phys. Rev. A 102, 063104 (2020). [4] Le, C.-T., Hoang, V.-H., Tran, L.-P. & Le, V.-H. Effect of the dynamic core-electron polarization of CO molecules on high-order harmonic generation. Phys. Rev. A 97, 043405 (2018). [5] Zhang, B., Yuan, J. & Zhao, Z. Dynamic orbitals in high-order harmonic generation from CO molecules. Phys. Rev. A 90, 035402 (2014).

Presenter: Phan Thi Ngoc-Loan

I.8 – Invited, VCTP-46

Study on radio emission from extensive air showers by using MGMR3D

Trinh Thi Ngoc Gia (1), Olaf Scholten (2), Nguyen Thanh Phong (3), Dang Trung Si (4), Nguyen Thi Kim Ngoc (3), Huynh Anh Huy (1)

(1) Physics Education Department, School of Education, Can Tho University; (2) Vrije Universiteit Brussel, Dienst ELEM, Brussels, Belgium; (3) Physics Department, School of Science, Can Tho University; (4) Chau Van Liem High School, Can Tho City

High-energy cosmic rays going into the atmosphere can generate a particle avalanche called an extensive air shower. The charged particles in the air shower emit radiation. During thunderstorms, radio emission from extensive air showers is influenced by atmospheric electric fields. Thus, strong electric fields in the atmosphere can be determined by radio emission from extensive air showers. MGMR3D is a code that calculates the complete radio footprint, i.e. intensity, polarization and pulse shapes, for a parametrized shower-current density using a semi-analytic approach. This non-Monte-Carlo code is fast (typically 10 seconds for a complete footprint) and thus can be used in a chi-square optimization calculation of atmospheric electric fields. In order to improve parametrization for MGMR3D, a comparison between the results of a microscopic model of radio emission, CoREAS, and the ones of MGMR3D is made.

Acknowledgement: This research is funded by the Vietnam National Foundation for Science andTechnology Development (NAFOSTED) under Grant 103.01-2019.378.

Presenter: Trịnh Thị Ngọc Gia

I.9 – Invited, VCTP-46

Mass relation for unified multiplet of vector mesons in extradimensions

Dao Vong Duc (1) , Huynh Quoc Trung (2)

(1) Institute of Physics, Hanoi; (2) Tây Dô University, Can Tho Province

Presenter: Dao Vong Duc

I.10 – Invited, VCTP-46

Entanglement and continuous variable quantum teleportation via two modes nonclassical states

Truong Minh Duc

Center for Theoretical and Computational Physics, Hue University of Education, Hue University, Hue, Viet Nam

In this talk, we present the entanglement of the two modes nonclassical states as two-mode squeezed vacuum states and pair coherent states. It is shown that when adding and subtracting photons to two-mode squeezed vacuum states or pair coherent states, the entanglement of the proposed states can be enhanced. Then, we discuss the quantum teleportation processes for teleporting a coherent state via the states given above. It indicates that the role of the photon addition and photon subtraction is important in increasing the average fidelities of the quantum teleportation processes to the maximum value.

Presenter: Truong Minh Duc

I.11 – Invited, VCTP-46

Lattice dynamics and electronic properties of small-angle twisted bilayer graphene

Viet-Hung Nguyen

Université catholique de Louvain (UCLouvain), Louvain-la-Neuve, Belgium

Twisted bilayer graphene (TBLG) is created by rotating the two crystal layers in bilayer graphene with respect to each other. Owning to the outstanding and nicely tunable properties, TBLGs display many fascinating features, especially, those related to the electronic flat bands and the corresponding strong electronic localization observed when the twist angle is close to magic ones. Indeed, superconductivity, correlated insulating states, magnetism, and quantized anomalous Hall states have been explored in magic-angle TBLGs (see the recent review [1] and references therein), thus giving rise to the nascent research field of "twistronics".

In this context, a good understanding of the intrinsic electronic properties and lattice vibrations as well as electron-phonon interactions within these graphene systems has been highly desirable in recent years. In this talk, I will present the recent studies [2-4] on these fundamental properties of small-angle TBLGs. At small twist angles $\leq 1.1^o$, TBLGs undergo a self-organized lattice reconstruction [5], strongly modifying their stacking structure with the presence of a domain wall network. The stacking structure of TBLG at small twist angles is hence very different from that of large angle ones where the moiré superlattice evolves smoothly. The resulting reconstructed superlattice significantly modulates the vibrational and electronic structures within the material, leading to changes in the behavior of electron-phonon coupling and to the observation of strong correlations and superconductivity. These features have been explored and slolidly clarified by both Raman spectrocopies and theoretical simulations [2-4]. In addition, our works [3,4] analyzing both global and local quantities provide a comprehensive and accurate understanding of the electronic properties of small-angle TBLG systems. Especially, the contradiction between the theoretical and experimental studies previously published on the emergence of small magic angles $< 1.1^o$ has been solidly clarified [3].

REFERENCES: [1] E. Y. Andrei and A. H. MacDonald, Nat. Mater. 19, 1265-1275 (2020) [2] M. Lamparski et al., 2D Mater. 7, 025050 (2020); DOI:10.1088/2053-1583/ab7874 [3] V. Hung Nguyen et al., 2D Mater. 8, 035046 (2021); DOI:10.1088/2053-1583/ac044f [4] A. C. Gadelha et al., Nature 590, 405-409 (2021); DOI:10.1038/s41586-021-03252-5 [5] H. Yoo et al., Nat. Mater. 18, 448-453 (2019)

Presenter: Nguyen Viet Hung

I.12 – Invited, VCTP-46

Magic configurations in moiré superlattice of bilayer photonic crystal

Hai-Chau Nguyen

University of Siegen

We investigate the physics of photonic band structures of the moiré patterns that emerged when overlapping two unidimensional (1D) photonic crystal slabs with mismatched periods. The band structure of our system is a result of the interplay between intralayer and interlayer coupling mechanisms, which can be fine-tuned via the distance separating the two layers. We derive an effective Hamiltonian that captures the essential physics of the system and reproduces all numerical simulations of electromagnetic solutions with high accuracy. Most interestingly, magic distances corresponding to the emergence of photonic flatbands within the whole Brillouin zone

of the moiré superlattice are observed. We demonstrate that these flatband modes are tightly localized within a moiré period. Our results show that the band structure of bilayer photonic moiré can be engineered in the same fashion as the electronic/excitonic counter-parts. Our work therefore paves the way to the possibility of exploring the many-body physics with photonic moiré systems.

Presenter: Nguyen Hai Chau

I.13 – Invited, VCTP-46

The exceptional properties of non-Hermitian photonics with subwavelength optical lattices

Hai Son Nguyen

Institut des Nanotechnologies de Lyon, Ecole Centrale de Lyon, 69130 Écully, France

The maturity of nanophotonics in both nanofabrications and theoretical conceptions provides a versatile platform to study open quantum system with custom-cut gain and losses mechanisms. Interestingly, while rigorous quantum formalismfor open systems replaces Hermitian Hamiltonians of Schrödinger equation by Liovillian supeoperators for the density matrix, non-conservative photonic systems can be nicelydescribed by non-Hermitian Hamiltonians. As consequences, the eigenstates of the system are quasinormal modes with complex eigenvalues. This leads to intriguing features such as Exceptional Points (EPs) at which both eigenstates and eigenvalues coalescence simultaneously, and Bound State In the Continuum (BICs) due to destructive quantum interference.

In this presentation, I will first introduce the non-Hermitian Hamiltonian formalism with a 2x2 toy model example. Then I will show how to engineer such a Hamiltonian with photonic platform, making use of subwavelength scale photonic crystal. The experimental observation of BICs and EPs will be described in detail. Finally, we will discuss on the topological nature of our non-Hermitian system (polarization singularities, band inversion of non-Hermtian band structures, non-Hermitian winding numbers).

References: [1] Bound states in the continuum, Nature Reviews Materials, 1, 16048 (2016) (DOI: 10.1038/natrevmats.2016.48) [2] Exceptional points in optics and photonics, Science, 363, 6422, eaar7709 (2019) (DOI: 10.1126/science.aar7709)

Presenter: Nguyen Hai Son

O.1 – Oral, VCTP-46

On a viable anisotropic power-law k-inflation model

Tuan Q. Do

Phenikaa Institute for Advanced Study, Phenikaa University, Hanoi, Vietnam

We have found an exact anisotropic Bianchi type I solution to a power-law k-inflation model in the presence of unusual supergravity-motivated coupling between scalar and electromagnetic fields as $f^2(\phi)F_{\mu\nu}F^{\mu\nu}$. Furthermore, stability analysis based on the dynamical system method has been performed to indicate that the obtained solution admits stable and attractive hairs during an inflationary phase and therefore violates the cosmic no-hair conjecture. More interestingly, we have shown that the corresponding tensor-to-scalar ratio of this model turns out to be highly consistent with the observational data of the Planck 2018.

Presenter: Do Quoc Tuan

O.2 – Oral, VCTP-46

Is the Standard Model in the Swampland? - Consistency requirements from gravitational scattering

Katsuki Aoki (1), Tran Quang Loc (2), Toshifumi Noumi (3), and Junsei Tokuda (3)

(1) Center for Gravitational Physics, Yukawa Institute for Theoretical Physics, Kyoto University, 606-8502, Kyoto, Japan; (2) Department of Applied Mathematics & Theoretical Physics, University of Cambridge, Wilberforce Road, Cambridge CB3 0WA, United Kingdom; (3) Department of Physics, Kobe University, Kobe 657-8501, Japan

We study compatibility of the Standard Model of particle physics and General Relativity by means of gravitational positivity bounds, which provide a necessary condition for a low-energy gravitational theory to be UV completable within the weakly coupled regime of gravity. In particular, we identify the cutoff scale of the Standard Model coupled to gravity by studying consistency of light-by-light scattering. While the precise value depends on details of the Pomeron effects in QCD, the cutoff scale reads 10^{16} GeV if the single-Pomeron exchange picture works well up to this scale. We also demonstrate that the cutoff scale is lowered to 10^{13} GeV if we consider the electroweak theory without the QCD sector.

Presenter: Tran Quang Loc

O.3 – Oral, VCTP-46

Equation of state of asymmetric nuclear matter and the tidal deformability of neutron star

Ngo Hai Tan (1), Dao T. Khoa (2)

(1) Phenikaa University; (2) Vietnam Atomic Energy Institute

Neutron star (NS) is a unique astronomical compact object where the four fundamental interactions have been revealed from the observation and studied in different ways. While the macroscopic properties of NS like mass and radius can be determined within the General Relativity using a realistic equation of state (EOS) of NSmatter, such an EOS is usually generated by a nuclear structure model like, e.g., the nuclear mean-field approach to asymmetric nuclear matter. Given the radius of NS extended to above 10 km and its mass up to twice the solar mass, NS is expected to be tidally deformed when it is embedded in a strong tidal field. Such a tidal effect was confirmed unambiguously in the gravitation wave signals detected recently by the LIGO and Virgo laser interferometers from GW170817, the first ever direct observation of a binary NS merger. In this report we summary our recent work on constructing the EOS of NS matter within our nonrelativistic HF framework, then the determined tidal deformability, gravitational mass, and radius of NS. The mean-field results are compared with the constraints imposed for these quantities by the global analysis of the observed Gravitation-Wave datas, and a strong impact by the incompressibility of nuclear matter on the hydrostatic configuration of NS is shown.

Presenter: Ngô Hải Tân

O.4 – Oral, VCTP-46

First-principles study on the absorption of aceton, ethanol, and propanal on WS2 monolayer

Tran Quang Huy (1), Tran Thi Nhan (2), Luong Thi Theu (3), Van An Dinh (4)

(1) Faculty of Physics, Hanoi Pedagogical University 2, Hanoi, Vietnam (2) Hanoi University of Industry, 298 Cau Dien, Hanoi, Vietnam (3) Institute of Applied Technology, Thu Dau Mot University, Binh Duong Province, Vietnam (4) Department of Precision Engineering, Graduate School of Engineering, Osaka University, Osaka 565-0871, Japan

This presentation reports the adsorption mechanism of the Volatile Organic Compounds (VOCs) on the monolayer WS2 using the density functional theory (DFT). To characterize the adsorption of there VOC molecules (acetone, ethanol, and propanal) and the WS2 substrate, we adopted the non-empirical van der Waals DFT simulations. The global minimum energy configuration, binding energy and adsoption energy of VOC molecules adsorbed on WS2 were determined using the Computational DFT-based Nanoscope tool [1] in order to explore the binding possibilities of VOC molecules on the surface of WS2. The adsorption energy profiles were calculated by employing the five van der Waals functionals, namely revPBE-vdW, optPBE-vdW, vdW-DF2, optB88, and optB86b. The results showed that the adsorption energy increases in the following sequence optPBE $<$ optB88 $=$ optB86b $<$ revPBE $<$ vdW-DF2. Among the above three VOC molecules, acetone is the most sensitive gas to be adsorbed by WS2 with the largest adsorption energy (390meV) and the largest reduction in the bandgap (33meV, i.e 1.71% in comparison with the non-adsorption). Detailed discussions on the interaction between VOC molecules and the WS2 substrate in terms of charge transfer, electronic structure, substrate deformation are also given.

[1] Computational DFT-based Nanoscope, developed by Van An Dinh (2017).

Presenter: Tran Quang Huy

O.5 – Oral, VCTP-46

Effect of temperature on electrical property of Ceria based electrolytes by doping Samaria and Gadolinia

Le Thu Lam and Pham Ngoc Thu

Faculty of Natural Sciences and Technology, Tay Bac University, Sonla, Vietnam

The moment method in statistical mechanics is applied to investigate the temperature dependence of electrical property of Ceria (CeO2) based electrolytes by doping Samaria (Sm2O3) and Gadolinia (Gd2O3). Vacancy-dopant association, migration, and activation energies for the vacancy diffusion are increasing functions of temperature. However, ionic conductivities are significantly enhanced at high temperatures. Notably, the maximum points in ionic conductivities are shifted to higher dopant concentrations with the increasing temperature.

Presenter: Le Thu Lam

O.6 – Oral, VCTP-46

Feature-Rich Electronic Properties of Carbon-Doped Silicene Nanoribbons: A First-Principles Investigations

Duy Khanh Nguyen

Institute of Applied Technology, Thu Dau Mot University

Structural and electronic properties of carbon-substituted silicene nanoribbons (SiNR) are investigated using the first-principles density functional theory (DFT) calculations. Through the DFT calculations, a complete first-principles theoretical framework is developed to fully characterize the carbon-enriched structural and electronic properties include the formation energies, optimal lattice parameters, phonon spectrum, orbital- and atom-decomposed electronic band structures, orbital- and atom-projected density of states (DOSs), spatial charge density distributions, and charge density difference along with various directions. Under C substitution effects, atomic configurations of the single C substitutions, double C substitutions under different adatom distributions of ortho, meta, and para, and full C substitutions are included in calculations, in which buckling of the pristine system is much reduced under the single and double C configurations that becomes a flat structure under the full C configuration. As a result, a typical hybridization mechanism of the quasi σ of Si-(3s,3px,3py) and C-(2s,2px,2py) and the quasi π of Si-3pz and C-2pz is formed in very strong Si-C bonds that lead to stable structures. As a close relationship, the C-diversified structures result in diverse electronic properties, in which the bandgap of the pristine system is almost opened under various C configurations. The largest opened bandgap of 2.37 eV is found at the full C configuration that is determined by quasi π bands of the highest occupied valence band of C-2pz and lowest unoccupied conduction band of Si-3pz. The C-enriched electronic properties of SiNR can be very potential for applications in optoelectronic devices. Besides, the C substitution-induced typical hybridization mechanism of the quasi σ and π orbitals that has been realized by the completely developed theoretical framework in this study can be fully generalized to other C-substituted systems.

Presenter: Nguyen Duy Khanh

O.7 – Oral, VCTP-46

Nanomechanical Stability of Aβ Tetramers and Fibril-like Structures: Molecular Dynamics Simulations

Adolfo B. Poma a,,†, Tran Thi Minh Thub,c,e,*, Lam Tang Minh Tric,e, Hoang Linh Nguyenb,d,e, and Mai Suan Lif,†*

a. Institute of Fundamental Technological Research, Polish Academy of Sciences, Pawińskiego 5B, 02-106, Warsaw

b. Institute for Computational Science and Technology, SBI Building, Quang Trung Software City, Tan Chanh Hiep Ward, District 12, Ho Chi Minh City, Viet Nam

c. Faculty of Materials Science and Technology, Ho Chi Minh City University of Science - VNUHCM, 227 Nguyen Van Cu Street, District 5, Ho Chi Minh City, Viet Nam

d. Ho Chi Minh City University of Technology (HCMUT), Ho Chi Minh City 700000, Vietnam

e. Vietnam National University, Ho Chi Minh City 700000, Vietnam

f. Institute of Physics, Polish Academy of Sciences, Al. Lotników 32/46, 02-668 Warsaw, Poland

Alzheimer's disease (AD) is a neurodegenerative disorder and one of the main causes of dementia. The disease is associated with amyloid beta (Aβ) peptide aggregation forming initial clusters, then fibril structure and plaques. Other neurodegenerative diseases such as type 2 diabetes, amyotrophic lateral sclerosis, and Parkinson's disease follow a similar mechanism. Therefore, inhibition of Aβ aggregation is considered an effective way to prevent AD. Recent experiments have provided evidence that oligomers are more toxic agents than mature fibrils, prompting researchers to investigate various factors that may influence their properties. One of these factors is nanomechanical stability, which plays an important role in the self-assembly of Aβ and possibly

other proteins. This stability is also likely to be related to cell toxicity. In this work, we compare the mechanical stability of Aβ-tetramers and fibrillar structures using a structure-based coarse grained (CG) approach and all-atom molecular dynamic simulation. Our results support the evidence for an increase in mechanical stability during the Aβ fibrillization process, which is consistent with in vitro AFM characterization of Aβ42 oligomers. Namely, using a coarse-grained model, we showed that the Young modulus of tetramers is lower than that of fibrils, and, as follows from the experiment, is about 1 GPa. Hydrogen bonds are the dominant contribution to the detachment of one chain from the Aβ fibril fragment. They tend to be more organized along the pulling direction, whereas in the Aβ tetramers no preference is observed.

Presenter: Tran Thi Minh Thu

O.8 – Oral, VCTP-46

Estimating Potential Inhibitors for AChE and SARS-CoV-2 Main Protease using Machine Learning, Molecular Docking, and Molecular Dynamics Simulations

T. Ngoc Han Pham (1), Quynh Mai Thai (2), Thien-Y Vu (3), Son Tung Ngo (4)

(1), (2), (3) Faculty of Pharmacy, Ton Duc Thang University, Ho Chi Minh City, Vietnam (4) Laboratory of Theoretical and Computational Biophysics, Ton Duc Thang University, Ho Chi Minh City, Vietnam (4) Faculty of Applied Sciences, Ton Duc Thang University, Ho Chi Minh City, Vietnam

Although traditional medicine and medicinal chemistry achieved a huge success, they require a lot of time and cost to develop a new therapy. In that context, computer-aided drug design (CADD) emerges as an effective and rapid tool for drug discoveries. In CADD, accurately determining the non-covalently chemical reactions between protein and ligand is the most important issue, which can be resolved via physical-based and knowledge-based approaches. In this work, molecular docking, fast pulling of ligand (FPL) simulations, and machine learning (ML) calculations were employed to estimate the potential inhibitors for AChE. In particular, ML was initially used to screen a large database of compounds. Autodock Vina (Vina) and Autodock4 (AD4) were then employed to estimate ligand-binding pose and affinity of ML top-lead compounds inhibiting AChE. Although AD4 indicates a more correlate ligand-binding affinity, Vina suggests a more accurate binding pose. FPL, is non-equilibrium dynamics stimulation using an external force as an inverse problem to find out how a ligand dissociation to a protein, was finally used to validate the docking results. Cassiamin A and B probably play as potential inhibitors for Alzheimers prevention. Besides, using a combination of molecular docking and FPL simulations, periandrin V, penimocycline, cis-p-Coumaroylcorosolic acid, glycyrrhizin, and uralsaponin B were suggested that are possible inhibitors for SARS-COV-2 main protease (3CL or Mpro). Although the computational approaches were rigorously applied, further experiments should be carried out to refine the obtained results.

Presenter: Pham Thi Ngoc Han

O.9 – Oral, VCTP-46

Investigating structural differences of the SARS-CoV-2 Mpro binding site before and after covalent bond formation with ligands: enabling efficient and accurate virtual screening campaigns.

Hien T. T. Lai (1), Giulia Rossetti (2, 3, 4), Toan T. Nguyen (1), Paolo Carloni (2, 5, 6) and

Agata Kranjc (2, 7, 8)

(1) VNU Key Laboratory for Multiscale Simulation of Complex Systems, VNU University of Science, Vietnam National University, Hanoi, 11416, Vietnam; (2) Institute of Neuroscience and Medicine (INM-9)/Institute for Advanced Simulation (IAS-5), Forschungszentrum Jülich, D-52425 Jülich, Germany; (3) Jülich Supercomputing Center (JSC), Forschungszentrum Jülich, 52428 Jülich, Germany; (4) University Hospital Aachen, RWTH Aachen University, 52078 Aachen, Germany; (5) RWTH Aachen University, Department of Physics, 52078 Aachen, Germany; (6) JARA-BRAIN Institute "Molecular Neuroscience and Neuroimaging" INM-11, Forschungszentrum Jülich, 52428, Jülich, Germany; (7) CNRS, Université de Paris, UPR 9080, Laboratoire de Biochimie Théorique, 13 rue Pierre et Marie Curie, F-75005, Paris, France; (8) Institut de Biologie Physico-Chimique-Fondation Edmond de Rotschild, PSL Research University, Paris, France;

The Severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) that causes the COVID-19 disease became a global public-health emergency. The SARS-CoV-2 main protease (SARS-CoV-2 Mpro) plays an important role in the viral transcription and replication, therefore it is among the best-characterized proteins of SARS-CoV-2 virus and represents a very attractive target for drug development. It is extremely important to find drugs for the SARS-CoV-2 Mpro binding site. Most of known ligands bind covalently to this target, however it is computationally unfeasible a virtual screening of millions of compounds accurately including covalent bond formation. In this project we will study and characterize in-silico the detailed structure of the binding pocket of the protein (possibly quite different from the crystallographic apo structure) in presence of effective inhibitors (molecules 11a and 11b, where X-ray structures have been obtained) before and after the formation of the covalent bond. This will open the possibility to perform effective non-covalent virtual screening of millions of compounds while retaining high chances of finding good covalent ligands. The outcome of this study will therefore provide an essential tool to accelerate the search of drugs in the scientific community performing computer aided drug design.

Presenter: Lai Thi Thu Hien

O.10 – Oral, VCTP-46

Orbital magnetization in axially symmetric two-dimensional carbon allotrope: influence of electric field and geometry

Dai-Nam Le (1,2), Van-Hoang Le (3), Pinaki Roy (1,2)

(1) Atomic Molecular and Optical Physics Research Group, Advanced Institute of Materials Science, Ton Duc Thang University, Ho Chi Minh City, Vietnam; (2) Faculty of Applied Sciences, Ton Duc Thang University, Ho Chi Minh City, Vietnam; (3) Department of Physics, Ho Chi Minh City University of Education, 280 An Duong Vuong St., Dist. 5, Ho Chi Minh City, Vietnam.

In this study, we use supersymmetry formalism to study (2+1) dimensional Dirac–Weyl equation describing the motion of electrons in different axially symmetric carbon allotrope surfaces under the influence of crossed electromagnetic fields. In particular, we consider three-carbon allotrope with different geometrical shapes and properties: open, half-open, and closed geometries. The effect of the electric field and geometry on Landau levels and orbital magnetization has been examined. It has been shown that at a critical electric field the orbital magnetization exhibits a discontinuity which is associated with the collapse of Landau levels.

References: [1] Dai-Nam Le, Van-Hoang Le, and Pinaki Roy 2020 J. Phys.: Condens. Matter 32 385703; [2] Dai-Nam Le, Anh-Luan Phan, Van-Hoang Le, and Pinaki Roy 2019 Physica E107,

60; [3] Dai-Nam Le, Van-Hoang Le, and Pinaki Roy 2019 J. Phys.: Condens. Matter 31 305301
[4] Anh-Luan Phan, Dai-Nam Le, Van-Hoang Le, and Pinaki Roy 2019 Physica E114, 113639
[5] Dai-Nam Le, Anh-Luan Phan, Van-Hoang Le, and Pinaki Roy 2019 EPL 127 10005

Presenter: Le Dai-Nam

O.11 – Oral, VCTP-46

Aldehyde Gas Absorption on Monolayer WSe_2

Tran Thi Nhan (1), Tran Quang Huy (2), Luong Thi Theu (2), Dinh Van An (3)

(1) Hanoi University of Industry, 298 Cau Dien street, Bac Tu Liem, Hanoi; (2) Hanoi Pedagogical University of Number 2, Xuan Hoa, Vinh Phuc; (3) Department of Precision Engineering, Graduate School of Engineering, Osaka University, Osaka, Japan

We present a systematically non-empirical van der Waals density functional study on the adsorption of the aldehyde gas molecules, including methanal, propanal, and methacrolein, on the monolayer (ML) WSe_2. The most stable configuration of the gas-WSe_2 adsorption systems was explored by carefully optimizing the geometry structure and calculating the interaction energy as a function of spatial coordinates based on the Computational DFT-based Nanoscope tool. Simultaneously, the diffusion paths of the gas molecules on the ML WSe_2 were predicted. The adsorption mechanism and charge transfer inside the adsorption systems are discussed in great details. It was found that these aldehyde gases are physisorbed on WSe_2 with a relatively high adsorption energies and their dipole polarization is enhanced due to the great amount of charge transfer from Carbon to Hydrogen atoms. The adsorption causes a slightly lattice deformation, the changes in the electronic structure and consequently the electronic properties of ML WSe_2. The gas molecules receive charges due to the fact that the charge donation of the Se atoms is larger than the charge backdonation of the oxygen atom. ML WSe_2 is predicted to interact with the three gases by van der Waals interaction and may be used as a physic-resistance aldehyde gas sensing devices with high performance.

Presenter: Trần Thị Nhàn

O.12 – Oral, VCTP-46

Glassy network structure of CaO-SiO2 and CaO-Al2O3-SiO2 melts: insight from Molecular Dynamics Simulation

Hong Nguyen Van, Nguyen van Huong, Mai Thi Lan

Hanoi University of Science and Technology

Local structure environment and network structure of multicomponent oxide systems [CaO-SiO2 (brief as CS) and CaO-Al2O3-SiO2 (brief as CAS)] at 3500 K are investigated by molecular dynamics simulation. The local structure environment of atoms is clarified via investigation of pair-radial distribution function (PRDF), coordination number distribution and topology of basic coordination units. Network structure of TOx-polyhedra (T=Al, Si; x=3, 4, 5, 6) is clarified through investigation of distribution of linkage types. Incorporation mechanism of Ca2+ cations into glassy network, aluminum avoidance as well as the compositional and structural heterogeneities (micro-phase separation) in CS and CAS melt are also discussed in detail.

Presenter: Nguyen Van Hong

O.13 – Oral, VCTP-46

Effect of static electric field on odd-even high-order harmonic generation

Doan-An Trieu, Ngoc-Loan Phan, Van-Hoang Le

Ho Chi Minh City University of Education

Interaction of atoms/molecules with ultrashort intense laser pulses leads to high-order harmonic generation (HHG), a fascinating non-linear effect. For atoms or symmetric molecules, the HHG spectra contain odd harmonics only. However, many studies have recently focused on asymmetric molecules that emit high-order harmonics with both odd and even orders due to symmetry breaking. This property is essential; thus, the ratio of adjacent even and odd harmonics, briefly called the even-to-odd ratio, is introduced to characterize such HHG spectra [1].

In this study, we utilize a simple model that mimics a polar molecule, a one-dimensional hydrogen atom in a weak electric field, to investigate the effect of asymmetricity on the even-to-odd ratio. Because the electric field also significantly broadens the plateau region in HHG spectra [2, 3], we also study the electric field effect on the plateau structure and extending the HHG cutoff. The HHG data are simulated by numerically solving the time-dependent Kohn-Sham equation embedded in the Octopus source codes [4]. We find out that the dependence of the even-to-odd ratio on the static electric field can be separated into two distinct regions with different behaviors. With increasing the static electric field, the even-to-odd ratio grows exponentially, and then, after reaching a critical point, it fluctuates irregularly. Remarkably, this dependence is stable for different laser pulses. The underlying mechanism that leads to this interesting dependence is also clarified. Besides, we also detect the multiple-plateau structure of HHG spectra and explain its formation by using the classical simulation.

[1] N.L. Phan, C.T. Le, V.H. Hoang, and V.H. Le, "Odd-even harmonic generation from oriented CO molecules in linearly polarized laser fields and the influence of the dynamic core-electron polarization," Phys. Chem. Chem. Phys. 21, 24177 (2019). [2] H. Liu, Z.Z. Zhang, Y.J. Wu, S.C. Jiang, and C. Yu, "Isolated attosecond pulses generation from coherent superposition state of helium ion in static electric fields and spatial nonhomogeneous fields," Int. J. Mod. Phys. B 30, 1650229 (2016). [3] C.L. Xia, G.T. Zhang, J. Wu, and X.S. Liu, "Single attosecond pulse generation in an orthogonally polarized two-color laser field combined with a static electric field," Phys. Rev. A 81, 043420 (2010). [4] M.A.L. Marques, A. Castro, G.F. Bertsch, and A. Rubio, "Octopus: A first-principles tool for excited electron-ion dynamics," Comput. Phys. Commun. 151, 60 (2003).

Presenter: Trieu Doan An

O.14 – Oral, VCTP-46

Practical quantum computation of ground state energy level using full quantum eigensolver method

Nguyen Van Duy (1,2), Nguyen Cong Ha (1,3), Nguyen Quoc Hung (3), Do Van Nam (1)

(1) Phenikaa Institute of Advanced Study, Phenikaa University; (2) Faculty of Computer Science, Phenikaa University; (3) Nano and Energy Center, Hanoi University of Science, Vietnam National University in Hanoi

Various quantum computing methods for the calculation of the ground and the excited states of physical and chemical systems have been developed such as the full quantum eigensolver (FQE) method proposed in Shijie Wei et al. (2020). Compared to existing classical-quantum hybrid methods such as variational quantum eigensolver (VQE), the FQE method removes the classical optimizer and performs all the calculations on a quantum computer with faster convergence. In

this study, we demonstrate the practical application of the FQE method to calculate the ground state energy for the Ising model and molecular hydrogen.

Presenter: Nguyen Van Duy

O.15 – Oral, VCTP-46

Mobility edges in quasiperiodic mosaic lattice chains: A reflection geometry-based numerical study

Ba Phi Nguyen and Thi Than Ho

Department of Basic Sciences, Mientrung University of Civil Engineering

In this study, we numerically investigate the diffuse and localized properties in the one-dimensional quasiperiodic mosaic model whose on-site potentials are modulated for equally spaced sites. The mosaic modulation is parameterized by the so-called inlay parameter κ. When $\kappa = 1$ this model reduces to the famous Aubry-André-Harper (AAH) model [1] for which there no exist mobility edge (separating the diffuse phase from the localized phase). Using the formalism proposed in Ref. [2], we focus on studying the case of $\kappa \neq 1$. From the numerical analysis, we find that there appear multiple mobility edges in this case. Interestingly, the number of mobility edges is always equal to $2(\kappa - 1)$. In addition, we also find that the critical strength of quasiperiodic potential in diffuse-localized transition is smaller than that in the standard AAH model. These results are totally consistent with those reported in Ref. [3] which the results were firstly obtained by using by an alternative method.

References: [1]. S. Aubry and G. André, Ann. Israel Phys. Soc. 3, 133 (1980). [2]. S. E. Skipetrov and A. Shina, Phys. Rev. B 97, 104202 (2018). [3]. Y. Wang et al., Phys. Rev. Lett. 125,196604 (2020).

Presenter: Nguyen Ba Phi

O.16 – Oral, VCTP-46

Effects of momentum-density dependent terms of the effective Skyrme interaction on neutron elastic scattering observables

H. Cong Quang (1,2), N. Hoang Tung (3,4,5,6), D. Quang Tam (7), T. V. Nhan Hao (1,2)

1) Center for Theoretical and Computational Physics, University of Education, Hue University, Hue City 52000, Vietnam 2) Faculty of Physics, University of Education, Hue University, Hue City 52000, Vietnam 3) Institute of Fundamental and Applied Sciences, Duy Tan University, Ho Chi Minh City 700000, Vietnam 4) Faculty of Natural Science, Duy Tan University, Da Nang City 550000, Vietnam 5) Department of Nuclear Physics and Nuclear Engineering, Faculty of Physics and Engineering Physics, University of Science, Ho Chi Minh City 700000, Vietnam 6) Vietnam National University, Ho Chi Minh City 700000, Vietnam 7) Faculty of Basic Sciences, University of Medicine and Pharmacy, Hue University, Hue City 52000, Vietnam

In this study, we will figure out the role of the (t4,t5) terms of the effective Skyrme interaction on the imaginary part, angular distributions and analyzing powers of neutron elastic scattering at low-energies. To do it, the microscopic optical potential has been generated by using the framework of our recent publication [1] which is the particle-vibration coupling approach on top of the collective excited states obtained from the random-phase approximation.

[1] N. Hoang Tung, D. Quang Tam, Vinh N. T. Pham, Chi Lam Truong, and T. V. Nhan Hao, Phys. Rev. C 102, 034608 (2020)

Presenter: Tran Viet Nhan Hao

O.17 – Oral, VCTP-46

Pairing reentrance in odd nuclei

T. Vu Dong (1), L. Tan Phuc (2), N. Quang Hung (2)

(1) Faculty of Physics and Engineering Physics, Vietnam National University Ho Chi Minh City–University of Science, Ho Chi Minh City, Vietnam (2) Institute of Fundamental and Applied Sciences, Duy Tan University, Ho Chi Minh City 700000, Vietnam

The pairing correlations decrease with increasing temperature. However, in some nuclei, the pairing effect is strongly enhanced at a certain interval of temperature. This phenomenon was called pairing reentrance. In this work, we study some testing configurations of nuclear single-particle levels, which can produce this reentrance. The results show that the configurations with an odd nucleon number obtain the pairing reentrance effect. This effect will be suspended by decreasing the single-particle energy gap of the two levels nearest the Fermi surface. The calculations for realistic candidate Calcium isotopes also confirm this phenomenon.

Presenter: Le Tan Phuc

O.18 – Oral, VCTP-46

Self-consistent mean-field description of nucleon radiative capture reactions in nuclear astrophysics

Nguyen Le Anh (1,2,3), Phan Nhut Huan (4,5), Bui Minh Loc (6,7)

(1) Department of Physics, Ho Chi Minh City University of Education, Ho Chi Minh City, Vietnam; (2) Department of Theoretical Physics, Faculty of Physics and Engineering Physics, University of Science, Ho Chi Minh City, Vietnam; (3) Vietnam National University, Ho Chi Minh City, Vietnam; (4) Institute of Fundamental and Applied Sciences, Duy Tan University, Ho Chi Minh City, Vietnam; (5) Faculty of Natural Sciences, Duy Tan University, Da Nang City, Vietnam; (6) Division of Nuclear Physics, Advanced Institute of Materials Science, Ton Duc Thang University, Ho Chi Minh City, Vietnam; (7) Faculty of Applied Sciences, Ton Duc Thang University, Ho Chi Minh City, Vietnam

Radiative-capture reactions play an important role in the nucleosynthesis. The cross sections of nucleon radiative capture reactions can be obtained using a single self-consistent mean-field. The Skyrme Hartree-Fock calculation describes well not only bound states but also the scattering states in the microscopic analysis of the nucleon-induced reactions with astrophysical aspects. The theoretical results for nucleon radiative capture by light nuclei will be compared with available experimental data.

Presenter: Nguyen Le Anh

O.19 – Oral, VCTP-46

Double polarization signals in diboson productions at the LHC

Le Duc Ninh

Institute For Interdisciplinary Research in Science and Education, ICISE, Quy Nhon, Vietnam

Measuring the double polarization signals in diboson production at the LHC will provide a test

of the Standard Model at a very deep level. ATLAS has recently reported the first measurements of single polarizations of a massive gauge boson in the WZ production channel. The aim is now shifting to the double polarizations of a diboson system and we hope that they will be measured by ATLAS and CMS in the next few years. In this talk, I will provide an experimental and theoretical status of this research direction and present some of our latest results concerning the calculation of QCD and electroweak corrections to polarization observables of massive gauge bosons.

Presenter: Le Duc Ninh

O.20 – Oral, VCTP-46

Two-Loop $\mathcal{O}\left(\alpha_{\sqcup} + \alpha_{\lambda} + \alpha_{\kappa}\right)^{\in}$ Corrections to the Higgs Boson Masses in the CP-Violating NMSSM

Thi Nhung Dao (1), Martin Gabelmann (2), Margarete Muehlleitner (2), Heidi Rzehak (3)

(1) Institute For Interdisciplinary Research in Science and Education, ICISE, Vietnam (2) Institute for Theoretical Physics, Karlsruhe Institute of Technology, Germany (3) Institute for Theoretical Physics, University of Tübingen, Germany

The Higgs boson mass has turned into a precision observable with an uncertainty of a few hundred MeV at the LHC and provides an important constraint on the parameter space of supersymmetric models. To have sensible limits, the experimental accuracy has to be matched by the precision of the theory predictions. Consequently, a tremendous effort has been put in the computation of the higher-order corrections to supersymmetric Higgs boson masses.

In this talk, we report about our computation of the $\mathcal{O}\left(\alpha_{\sqcup} + \alpha_{\lambda} + \alpha_{\kappa}\right)^{\in}$ two-loop corrections to the Higgs boson masses of the CP-violating Next-to-Minimal Supersymmetric Standard Model (NMSSM) using the Feynman-diagrammatic approach. We discuss the renormalization schemes used for the Higgs sector and the top/stop sector, together with the treatment of the infrared divergences which appear in the gaugeless and zero momentum approximation. We present the numerical impact of the new corrections and their dependence on the renormalization scheme and the renormalization scale. Our new corrections have been implemented in the Fortran code **NMSSMCALC** that computes the Higgs mass spectrum of the CP-conserving and CP-violating NMSSM as well as the partial decay widths of the Higgs bosons including the state-of-the-art higher-order corrections. Our results mark another step forward in the program of increasing the precision in the NMSSM Higgs boson observables.

Presenter: Dao Thi Nhung

O.21 – Oral, VCTP-46

Calculating multipole form factors and investigating the influence of the weak interaction in e-6Li elastic scattering at high energies

Luong Zuyen Phu (1), Vo Minh Truong (2)

(1): Dalat Nuclear Research Institute (2): Mien Tay Construction University, PhD Student of Vietnam Atomic Energy Institute

Scattering processes at low energies can be accurately described by the electromagnetic theory since the electromagnetic interaction plays a dominant role. However, at high energies of GeV and more, the weak interaction becomes significant. Therefore, we use the unified electroweak interaction theory and extend to the electron-nuclear scattering to confirm the participation and

role of the weak interaction and also test this theory when applying for complex systems. In this research, the scattering cross section will be expanded to the multipole form factors in the framework of the unified electroweak interaction theory by means of the multipole expansion method. The multipole form factors are the reduced matrix elements of the multipole operators. The electromagnetic current multipole operator expressions are completely recomputed in the Willey's manner and the newly calculated weak current multipole operator expressions are also based on the multiparticle shell model but at high energies. By using the calculating formulae for the reduced matrix elements of the tensor operators, we have fully established the formulae for calculating the multipole form factors of the nucleus A = 6. Applying the given formulae, we have also calculated the expressions of all multipole form factors that are present in the e-6Li elastic scattering cross section when the nucleus is in the ground state. On the basis of the calculated multipole form factors, we investigate the influence of weak interaction through the ratio of the interference and weak interaction term to the electromagnetic interaction term corresponding to the different incident electron energy values.

Presenter: Vo Minh Truong

O.22 – Oral, VCTP-46

Neutrino oscillation on a superconducting qutrit processor

Nguyen Cong Ha (1, 2), Bach Gia Bao (3), Tran Minh Duc (1), Mehta Isha (4), Nguyen Van Duy (2, 5), Nguyen Quoc Hung (1)

(1) Nano and Energy Center, Hanoi University of Science, Vietnam National University in Hanoi; (2) Phenikaa Institute of Advanced Study, Phenikaa University; (3) Faculty of Computer Science and Engineering, Ho Chi Minh University of Technology, Vietnam; (4) Chandigarh University, India; (5) Faculty of Computer Science, Phenikaa University

Over the recent years, there has been a growing interest in using Noisy Intermediate-Scale Quantum (NISQ) computers to simulate physical dynamics. In previous studies, neutrino oscillation has been demonstrated on two-level quantum processors using qubits to encode information and perform calculations. In this work, we implement a more direct quantum simulation of the evolution of a three-flavor neutrino by harnessing the power of three-dimensional quantum systems. We employ the anharmonicity of an IBM superconducting quantum computer to access its third energy level to realize a transmon qutrit. Using Qiskit Pulse and Q-CTRL to calibrate pertinent pulses to represent SU(3) quantum gates, we simulate neutrino oscillation by means of the time evolution of the qutrit.

Presenter: Nguyen Cong Ha

O.23 – Oral, VCTP-46

Sum squeezing, entanglement and quantum teleportation of the superposition of photon-added pair coherent state

Ho Sy Chuong (1,2), Truong Minh Duc (1)

(1) Center for Theoretical and Computational Physics, University of Education, Hue University, 34 Le Loi, Hue City, Viet Nam (2) Dong Nai University, 04 Le Quy Don, Bien Hoa city, Viet Nam

In this paper, we introduce a new state called superposition of photon-added pair coherent state. The two-mode sum squeezing property of this state is studied. It indicates that this state has

two-mode sum squeezing. This state is an entangled state and the entanglement degree can be enhanced by adding photons to both modes. When using this state as an entangled resource for quantum teleportation, the results show that the quantum teleportation process is successful and the average fidelity of the process can be higher than the case where the pair coherent state is used if parameters are selected appropriately.

Presenter: Hồ Sỹ Chương

O.24 – Oral, VCTP-46

Joint remote preparation of single-photon in three degrees of freedom with two hyper-bell state pairs

Cao Thi Bich (1) and Nguyen Ba An (1,2)

(1) Center for Theoretical Physics, Institute of Physics, Vietnam Academy of Science and Technology (VAST), 18 Hoang Quoc Viet, Cau Giay, Hanoi, Vietnam (2) Thang Long Institute of Mathematics and Applied Sciences (TIMAS), Thang Long University, Nghiem Xuan Yem, Hoang Mai, Hanoi, Vietnam

Hyperentanglement has attracted much attention due to its fascinating applications in quantum communication. It becomes a promising resource in quantum information processing with its high capacity character. In this work, we devise a protocol for two senders to jointly prepare a single-photon in three qubit state for a receiver by using two hyper-Bell state pairs as quantum channels. Namely, Alice, Bob and Charlie are three remote parties. Alice and Bob independently share the classical knowledge of a secret single photon in three degrees of freedom which are polarization, left and right spatial-mode and internal and external spatial-mode in such a way that no one alone is able to fully identify the photon. The work presents how can Alice and Bob jointly prepare the photon for Charlie when they share beforhand two hyper-Bell state pairs.

Presenter: Cao Thi Bich

P.1 – Poster, VCTP-46

Phonon-drag thermopower magnetoquantum oscillations in a monolayer WS_2

Dinh Le (1), Phuc V. Huynh (2), Bich N. Tran (3, 4), Hoa T. Le (5)

(1) Center for Theoretical and Computational Physics, University of Education, Hue University, Hue 530000, Viet Nam; (2) Division of Theoretical Physics, Dong Thap University, Cao Lanh 870000, Viet Nam; (3) Faculty of Basic Sciences, Quang Binh University, Quang Binh 510000, Viet Nam; (4) Physics Department, University of Education, Hue University, Hue 530000, Viet Nam; (5) Physics Department, University of Education, Hue University, Hue 530000, Viet Nam.

The phonon-drag thermopower S^g is theoretically studied in a monolayer WS_2 in a quantizing magnetic field, considering the electron - 2D acoustic phonon interaction. S^g displays quantum oscillations as a function of magnetic B and temperature T. The amplitude of the oscillations is found to increase with increasing B and T. The power law $S^g \sim T^\beta$ is also investigated. With the increasing T the exponent β decreases.

Presenter: Trần Ngọc Bích

P.2 – Poster, VCTP-46

Half-wormhole solutions & Black Hole singularity

Nguyen Quoc Chuong (1), Tran Quang Loc (2), Le Duc Truyen (3)

(1) Vietnamese-German University (2) DAMTP, University of Cambridge (3) IFIRSE, ICISE

In AdS/CFT, the partition functions of decoupled boundary systems factorize in the "boundary" description, but not in the "bulk" description due to gravitational configurations that connect the two systems. These space-time Wormhole explanations give rise to the so-called "Factorizing Puzzle". Wormhole toy models such as SYK Model/JT Gravity, by studying the averaging over ensembles of the boundary systems, get rid of the puzzle. However, a current study (arXiv:2103.16754 [hep-th]) unveils a version of the puzzle from such models by considering single elements of the ensemble with fixed fermion couplings. It pointed out that new Half-wormhole saddles, which are non-self-averaging, exist and restore the factorization of semiclassical description. In this talk, we discuss Half-wormhole solutions and their possible realizations from Black Hole singularity.

Presenter: Tran Quang Loc

P.3 – Poster, VCTP-46

Theoretical investigation of diffusion and electrical properties of yttria-stabilized zirconia thin film

Le Thu Lam (1), Vu Van Hung (2), Dang Thanh Hai (3), Ho Khac Hieu (4)

(1) Faculty of Natural Sciences and Technology, Tay Bac University, Sonla, Vietnam (2) VNU University of Education, 182 Luong The Vinh Street, Thanh Xuan, Hanoi, Vietnam (3) Vietnam Education Publishing House, 81 Tran Hung Dao, Hoan Kiem, Hanoi, Vietnam (4) Institute of Research and Development, Duy Tan University, 03 Quang Trung, Hai Chau, Danang 550000, Vietnam

The diffusion and electrical properties of yttria-stabilized zirconia (YSZ) thin film with fluorite structure are theoretically investigated using the statistical moment method. Our results show the lattice expansion with the thickness reduction and the diffusion coefficient and ionic conductivity of YSZ thin film with thickness ranging from 10 nm to 20 nm are more than one to two orders of magnitude enhancement in comparison with those of bulk YSZ. The thickness dependence of the lattice constant, diffusion coefficient, and ionic conductivity is attributed to the interaction potential and anharmonicity lattice vibrations occurred at the external layers. The influence of the external layers on the diffusion and electrical properties of thin film decreases with the increasing thickness and this influence is negligible with the thickness exceeding 1000 nm. The roles of substrate and grain boundary are ignored in the present study. Our study contributes to the experiments related to the effect of the external layers on the diffusion and electrical properties of YSZ thin film.

Presenter: Le Thu Lam

P.4 – Poster, VCTP-46

Generation of multimode entangled states via projection operation

Tran Quang Dat (1), Truong Minh Duc (2), Do Huu Nha (3)

(1) University of Transport and Communications, No.3 Cau Giay Street, Lang Thuong Ward, Dong Da District, Hanoi, Vietnam; (2) Center for Theoretical and Computational Physics, University of Education, Hue University, Hue, Vietnam; (3) Hanoi National University of Education, Xuan Thuy, Cau Giay, Hanoi, Vietnam

In continuous variable system, a (M+N)-mode entangled state can be generated from two separable states, a M-mode entangled state and a N-mode one, by using a projection operation. We develop this method from a protocol by Gerry et al [Phys. Rev. A 84, 023810 (2011)]. Based on the original protocol, which includes two weak cross-Kerr nonlinearities, a displacement operation and a coherent state with high amplitude, we add a phase shifter and use a nonideal on-off photodetector instead of an ideal photodetector. More importantly, we replace coherent states at main input with two available entangled states. The process of production of the (M+N)-mode entangled state is clarified in detail. As a result, we obtain fidelity and corresponding probability in general forms. For some applications, we show that a trio coherent state and a new three-mode entangled one can be generated with nearly perfect fidelities even though the efficiency of photodetector is low and the nonlinearity of cross-Kerr mediums is very weak.

Presenter: Tran Quang Dat

P.5 – Poster, VCTP-46

Characterizing the octant resolving of mixing angle θ_{23} in the neutrino oscillation and the impact to the CP violation measurement

Phan To Quyen (1,2), Cao Van Son (1,3), Nguyen Thi Hong Van (4), Ankur Nath (5), Tran Van Ngoc (1,2)

(1) Institute for Interdisciplinary Research in Science and Education (IFIRSE), Quy Nhon, Vietnam; (2) Graduate University of Science and Technology, Vietnam Academy of Science and Technology, Hanoi, Viet Nam; (3) High Energy Accelerator Research Organization (KEK), Tsukuba, Ibaraki, Japan ; (4) Institute of Physics, Vietnam Academy of Science and Technology, Hanoi, Vietnam; (5) Department of Physics, Tezpur University, Assam, India

Based on the highly sensitive techniques for neutrino observation developed by Super-K over the years, Hyper-Kamiokande (HyperK) represents a further improvement in sensitivity. HyperK, which is the third generation neutrino detector in Japan, was approved for construction in 2020 and plan to start data-taking in 2027 with the expected physics discoveries. HyperK will be a discovery machine for proton decays, detection of astronomical sources and CP violation search. In this topic, we continute exploring the physics potential of HyperK in measuring the θ_{23} mixing angle. We knew that the octant of θ_{23} can be improved significantly with constraints established by reactor & DUNE experiments and systematic improvement of appearance samples. This report will show the quantity characterizes the octant resolving ability from the contribution of ν_μ and ν_τ in the neutrino mass eigenstate ν_3. It also shows the effects of the octant resolving to the measurement of CP violation in the lepton sector. If the octant of θ_{23} is known, CP violation sensitivity increases at true $\delta_{CP} = -\pi/2$. The sensitivity is improved significantly when the abibilty of octant resolving is optimal. And the relation of the octant resolving and CP violation sensitivity is expressed by the ratio of CP asymmetry and the statistic error of ν_e apprearance.

Presenter: Phan To Quyen

P.6 – Poster, VCTP-46

Electric field as a novel switch to control the magnetization and optical absorption spectra of defect blue phosphorene thin-films

Nguyen Thi Bao Trang(1), Nguyen Vo Anh Duy(2), Minh Triet Dang(3,), Van An Dinh(4)*

(1) FPT Polytechnic Can Tho, No.288, Nguyen Van Linh Road, Can Tho City 900000, Vietnam.

(2) Fschool Can Tho, No.600, Nguyen Van Cu Road, Can Tho City 900000, Vietnam. (3) School of Education, Can Tho University, 3-2 Road, Can Tho City 900000, Vietnam. (4) Department of Precision Engineering, Graduate School of Engineering, Osaka University, 2-1 Yamadaoka, Suita, Osaka 565-0871, Japan.

Abstract. Improving the optical absorption coefficient is essential to enhance the light conversion efficiency of thin-film organic solar cells. Here we report the use of an external electric field as a novel switch to improve the optical absorption capacity of two-dimensional defect blue phosphorene (BlueP) systems. Using density functional theory (DFT) with van der Waals functionals, we performed theoretical investigation on structural, electronic, magnetic and optical absorption properties of a pristine and a single-vacancy (SV) BlueP thin film, and of a BlueP system absorbing a Vanadium adatom. We demonstrate that from a semiconductor material, a BlueP layer with a SV defect becomes half-metallic, and the absorption spectra under an electric field parallel to the material plane has been significantly enhanced in the ultra-violet region. More interestingly, when a Vanadium transition metal is absorbed on this system, the applied electric field perpendicular to the BlueP plane not only doubles the optical absorption coefficient, but also switches ON/OFF the magnetic moments of this system. The prominent red shift of the absorption spectra towards the visible light range under selected polarizied directions paves a novel way to engineer solar cell devices with a BlueP materials. Acknowledgements. This research is funded by the Vietnam National Foundation for Science and Technology Development (NAFOSTED) under grant number 103.01-2018.308. MTD acknowledges prof. P. Schall at the University of Amsterdam and dr. J. Oldenziel at Stichting Science International in the Netherlands for supporting a high-performance computing system.

Presenter (application): Trang Thi Bao Nguyen (Master student)

Presenter: Nguyen Thi Bao Trang

P.7 – Poster, VCTP-46

Opto-electronic and vibrational properties of Nitrogen doped hexagonal-graphene quantum dots: A first principles study

Minh Triet Dang(1), Nguyen Vo Anh Duy(1), Nguyen Thanh Si(2), Pham Vu Nhat(2), Van An Dinh(3)

(1) School of Education, Can Tho University, 3-2 Road, Can Tho City 900000, Vietnam (2) Department of Chemistry, Can Tho University, 3-2 Road, Can Tho City 900000, Vietnam (3) Department of Precision Engineering, Graduate School of Engineering, Osaka University, 2-1 Yamadaoka, Suita, Osaka 565-0871, Japan

Graphene quantum dots (GQDs) have been widely studied recently thanks to its unique optical, electrical and optoelectrical properties in applications in solar devices. Here, we present the opto-electronic properties of hexagonal graphene quantum dots and nitrogen doped graphene quantum dots using first principles method. Based on density functional theory (DFT), we investigated the changes of geometry structure, density of states, projected density of states and optical absorption of quantum dots. We have shown that by doping a nitrogen atom to hexagonal graphene quantum dots, the optical absorption of quantum dots is red-shifted towards the visible light range compared to that of the pristine graphene quantum dots, and the doped Nitrogen atom introduces a clear signature of anisotropy of the absorption spectrum. Furthermore, by artificially stretching the Carbon atoms around the doped Nitrogen atom with a distance up to 20 percent of their bond-lengths, we succesfully widen these quantum dot bandgaps from a few milli-electron Volts up to a half electron Volt, which is essential to increase the energy conversion

capacity of these doped materials. These results highlight a novel approach of bottoming up the next generation of solar devices with assembled quantum dots to improve their light selectivity as well as efficiency.

Presenter: Nguyen Vo Anh Duy

P.8 – Poster, VCTP-46

Absorption mechanism of Monolayer MoSe2 towards Aldehyde Volatile Organic Compounds

Luong Thi Theu (1), Tran Thi Nhan (2), Tran Quang Huy (3), Van An Dinh (4)

(1) Institute of Applied Technology, Thu Dau Mot University, Binh Duong Province, Vietnam (2) Hanoi University of Industry, 298 Cau Dien, Hanoi, Vietnam (3) Faculty of Physics, Hanoi Pedagogical University 2, Hanoi, Vietnam (4) Department of Precision Engineering, Graduate School of Engineering, Osaka University, Osaka, Japan

We present a study on the interaction of aldehyde gas molecules (methanal, propanal, and methacrolein) on the surface of monolayer (ML) MoSe2 using the density functional theory (DFT). The five non-empirical van der Waals functionals including revPBE-vdW, optPBE-vdW, vdW-DF2, optB88, and optB86b, were employed. The images of the potential energy surfaces for various configurations of adsorbates on MoSe2 surface were investigated using the Computational DFT-based Nanoscope tool [1] to explore the most stable configurations and diffusion possibilities. The optB88-wdW functional providing the largest adsorption energy was used for discussing the adsorption mechanism, electronic structure, and charge transfer. A The electronic structure calculation and Bader charge analysis were used to investigate the nature of the bonding and interaction between gas molecules and ML MoSe2. [1] Computational DFT-based Nanoscope, developed by Van An Dinh (2017).

Presenter: Tran Quang Huy

P.9 – Poster, VCTP-46

Novel imprint of a vector doublet

P. V. Dong (1), D. V. Loi (1), L. D. Thien (2), and P. N. Thu (3)

(1) Phenikaa University; (2) Hoang Van Thu Specialized High School; (3) Tay-Bac University

It is shown that the presence of a vector doublet is suitable to address neutrino mass, dark matter, and the recent muon anomalous magnetic moment.

Presenter: Phung Van Dong

P.10 – Poster, VCTP-46

Mass spectrum of Higgs bosons in the 331ISS model, with the identification of neutral Higgs with the corresponding ones in THDM.

Ha Thanh Hung (1), Nguyen Thi Tham (1), Hoang Phuc Huan (1)

(1) Department of Physics, Hanoi Pedagogical University 2, Phuc Yen, Vinh Phuc, Vietnam

Using the Higgs potential in the most general form combined with the parameter limiting condition in the 331ISS model. We identify the two neutral Higgses in this model with the corresponding ones in THDM.

Presenter: Ha Thanh Hung

P.11 – Poster, VCTP-46

Some Essential Properties of Germanene Nanoribbons Under Potassium Doping Effect: A DFT Study

Vo Van On

Institute of Applied Technology, Thu Dau Mot University, Binh Duong, Vietnam

In the paper, we study some essential properties of Germanene nanoribbons under potassium doping with low concentrations (K: Ge =1:12; 1:6, and 1:3) by DFT calculations as the binding energies, optimal lattice parameters, atom-projected band structures, orbital- and atom-projected density of states (DOSs), and charge density distributions. Results show that potassium (K) adatom favorably adsorbs at the hollow site of GeNRs. The Potassium-doped systems belong to physical adsorptions, the adsorption energy in the 1K-NRGe configuration is minimum and gets -2.05eV. The bandgap of the K-NRGe adsorption systems seems to depend on the adsorption sites of K on the NRGe substrate, it reaches a maximum of 0.83eV in the 2K-NRGe configuration at the hollow site. The feature-rich electronic properties of GeNRs induced by the Kalium adatom doping effect are suitable for various applications in electronic devices.

Presenter: On Van Vo

P.12 – Poster, VCTP-46

Magnetic topological phases in the spinful Haldane model with spin exchange

Thanh-Mai Thi Tran and Minh-Tien Tran

Institute of Physics, Vietnam Academy of Science and Technology, Hanoi, Vietnam

Magnetic topological phases in the spinful Haldane model with spin exchange between itinerant electrons and magnetic moments are studied within the dynamical mean field theory. The magnetic nature of the phases is determined by the spontaneous magnetization, and the topological one is determined by the Chern number as well as the cross of the zeros of the diagonal Green function. A antiferromagnetic phase with topologically breaking of the spin symmetry, where electrons with one spin orientation are in topological insulating state, while electrons with the opposite spin orientation are in topologically trivial one, is realized as a mutual interplay between the spontaneous magnetization and the sublattice asymmetry.

Presenter: Tran Thi Thanh Mai

P.13 – Poster, VCTP-46

Magnetic phases in kagome magnets: dynamical mean field study

Tran Thi Thanh Mai, Nguyen Hong Son, and Tran Minh Tien

(1) Faculty of Physics, Hanoi National University of Education, Hanoi, Vietnam (2) Institute of Physics, Vietnam Academy of Science and Technology, Hanoi, Vietnam

Magnetic phases in a minimal model for kagome magnets are studied within the spatial dynamical mean field theory. The minimal model consists of a tight binding hopping and anisotropic double exchange on the kagome lattice. The spacial dynamical mean field theory is applied to 27 sites of the kagome lattice. A magnetic phase transition from out-of-plane ferromagnetic to in-

plane antiferromagnetic phases occurs at finite temperature. There is a finite temperature range where both the out-of-plane ferromagnetic and the in-plane antiferromagnetic phases coexist.

Presenter: Nguyễn Hồng Sơn

P.14 – Poster, VCTP-46

Entropy Scaling for Viscosity of Lennard-Jones Binary Mixtures

Phuc Nguyen(1), Han Tuong Luc(2), Cuong Quoc Doan(3), Hai Hoang(1)*

(1)Institute of Fundamental and Applied Sciences, Duy Tan University, Ho Chi Minh City 700000, Vietnam (2)Cao Thang Technical College, Ho Chi Minh City, Vietnam (3)Quang Binh University, Dong Hoi City, Vietnam

Viscosity of fluid is a key quantity in fluid mechanism. To estimate this property, a variety of methods, both correlative and theoretical ones, has been developed and reported in the literature [1]. Among them, an entropy scaling, originally proposed by Rosenfeld [2], has recently attracted a lot of attention as it expresses the dimensionless viscosity as a function of excess entropy [3]. This approach has been extensively employed to build viscosity correlations for pure modeling and real compounds [4], which has shown very promising results. However, its extension to mixtures has been less studied [5], which is probably due to the lack of mixture data, e.g. viscosity and excess entropy. The purpose of present work is to provide a scheme for the entropy scaling to compute mixture viscosity. To do so, we have first performed extensive molecular simulations to compute thermodynamics properties and viscosity of binary mixtures composed of Lennard-Jones species that differ from each other in terms of molecular parameters (molecular mass, molecular size, potential and shape). Then, possible mixing rules for the entropy scaling have been tested and discussed to propose the one that is able to predict good results.

Presenter: Nguyễn Phúc

P.15 – Poster, VCTP-46

Gas adsorption properties (N2, H2, O2, NO, NO2, CO, CO2, SO2, H2S, H2O and NH3) of the O-vacancy-containing monolayer Sc2CO2: a first-principles study

Khang D. Pham (1), Tuan V. Vu (2), Hong T.T. Nguyen (2), Hai L. Luong (3)

(1) Military Institute of Mechanical Engineering, Ha Noi, Vietnam (2) Division of Computational Physics, Institute for Computational Science, Ton Duc Thang University, Ho Chi Minh City, Vietnam (3) Department of Physics, Ho Chi Minh City University of Education, Ho Chi Minh City, Vietnam

In this work, we have studied the gas adsorption properties (N2, H2, O2, NO, NO2, CO, CO2, SO2, H2S, H2O and NH3) on the O-vacancy-containing Sc2CO2 monolayer by the calculations based on density functional theory. We have determined the preferred adsorption positions of gas molecules, the structural features of the O-vacancy-containing Sc2CO2 monolayer after adsorption of different gas molecules. The adsorption energy and charge transfer between the monolayer and the gas molecules were calculated. We find that H2, N2, NH3, H2S and H2O molecules are physisorbed, and CO2, CO, NO2, NO, O2 and SO2 molecules are chemisorbed in the neighboring area of the O-vacancy of the monolayer Sc2CO2. The existence of the O-vacancy significantly enhances the CO and CO2 adsorption intensity of the defect Sc2CO2 monolayer compared to the original Sc2CO2 monolayer. Our research results show that the O-vacancy-containing monolayer

Sc2CO2 can be used in resistive sensor to detect NO gas.

Presenter: Phạm Dinh Khang

P.16 – Poster, VCTP-46

Free-carrier screening in cylindrical quantum wires: Effect of dielectric mismatch and finite confinement potential

Nguyen Nhu Dat

Duy Tan University

The dielectric response function of the electron system in a cylindrical semiconductor quantum wire is derived within the random phase approximation by using the linear response theory in the quantum limit when the only lowest electron subband is assumed to be occupied. The wire is considered in both finite and infinite confinement potential models. The plasmon dispersion is obtained as a root of the dielectric function taking into account the mismatch of dielectric constants of the wire and the barrier materials. The impurity-limited electron mobility of the wire is calculated in the dependence on the ratio of the dielectric constants of the wire and the surroundings, and the wire size. It has been shown that the free-carrier screening is smaller with higher-κ dielectric environment, leading to a decrease in electron mobility in contrast to what has been reported in some previous publications.

Presenter: Nguyễn Như Đạt

P.17 – Poster, VCTP-46

Influence of temperature on the lattice constant of SrTiO3 perovskite by the statistical moment method with improved interatomic potential.

Cao Huy Phuong (1,2), Vu Van Hung (3)

(1) VNU University of Science, Hanoi, Vietnam; (2) Hung Vuong University, Phu Tho province, Vietnam; (3) VNU University of Education, Hanoi, Vietnam.

Temperature dependence of lattice constant of cubic Strontium titanate has been investigated using the statistical moment method. The lattice constant at various temperatures is derived in closed analytic form by including explicitly the anharmonic effects of the lattice vibrations. The potential with the partial charge model and Morse function is used, it allows modeling and calculating the numerical lattice constant at high temperature by the statistical moment method in good and reasonable agreement with the other theories and the experimental data.

Presenter: Cao Huy Phương

P.18 – Poster, VCTP-46

Stability of even-to-odd ratio to laser intensity and wavelength

Hien T. Nguyen (1,2,3), Ngoc-Loan Phan (4), Kim-Ngan H. Nguyen (4), Van-Hoang Le (4)

(1) University of Science, Ho Chi Minh City, Vietnam (2) Vietnam National University, Ho Chi Minh City, Vietnam (3) Tay Nguyen University, Buon Ma Thuot City, Vietnam (4) Ho Chi Minh City University of Education, Ho Chi Minh City, Vietnam

High-order harmonic generation (HHG) is a nonlinear effect occurring when atoms/molecules interact with an ultrashort intense laser pulse. It is well known that the HHG emitted from

polar molecules contains both odd and even harmonics. On another side, the ratio between intensities of the adjacent even and odd harmonics, briefly called the even-to-odd ratio, is an essential quantity related to the molecular asymmetry that makes it a promising tool for tracking molecular asymmetricity and dynamics [1,2]. However, for efficient applications, the even-to-odd ratio must be stable to change laser parameters such as intensity and wavelength. This report presents the study on the stability of HHG emitted from CO molecules interacting with different laser pulses of various intensities and wavelengths. The method of HHG calculation is based on numerically solving the time-dependent Schrödinger equation of the laser-molecule system. To study the stability of the even-to-odd ratio, we pay attention to the classical long and short trajectories of the ionized electron, which both contribute to the harmonics. As a result, we discover that the even-to-odd ratio is quite stable when truncating the long electron trajectories in the HHG simulation. This result is essential for applications, and fortunately, the truncation can be performed theoretically by restricting the absorbing boundary [2,3]. Moreover, the removal of the long trajectories is well known experimentally by the good phase-matching in the HHG measurement [4].

[1] Kim-Ngan Nguyen-Huynh, Cam-Tu Le, Hien T. Nguyen, Lan-Phuong Tran, and Ngoc-Loan Phan, Comm. Phys. 30 (2020), 197. [2] Ngoc-Loan Phan, Kim-Ngan H. Nguyen, Cam-Tu Le, Dinh-Duy Vu, and Van-Hoang Le, Phys. Rev. A 102 (2020), 063104. [3] Shujuan Yu, Bing Zhang, Yanpeng Li, Shiping Yang, and Yanjun Chen, Phys. Rev. A 90 (2014), 053844. [4] P. Rudawski, C. M. Heyl, F. Brizuela, J. Schwenke, A. Persson, E. Mansten, R. Rakowski, L. Rading, F. Campi, B. Kim, P. Johnsson, and A. L'Huillier, Rev. Sci. Instrum. 84 (2013), 073103.

Presenter: Nguyen Thi Hien

P.19 – Poster, VCTP-46

The resonance of the quantum Peltier coefficient in a parabolic quantum well of GaAs/GaAsAl in the case of confined optical phonon

Cao Thị Vi Ba (1), Nguyễn Thị Lâm Quỳnh (1), Nguyễn Quang Báu (1), Nguyễn Bá Đức (2)

(1) VNU University of Science (2) Tan Trao University

The resonance of the quantum Peltier coefficient (qPC) in a parabolic quantum well (PQW) of GaAs/GaAsAl, subjected in a dc electric field, a magnetic field and a laser radiation, has been theoretically studied by using the kinetic equation method with the assumption that the confined electron-confined optical phonon scattering is essential. The obtained analytical expression for the qPC in PQW is as a function of external fields, PQW parameters, and especially the quantum number m which was changed in order to characterize the influence of confined acoustic phonon. When m is set to zero, we obtained the results that corresponded to the case of unconfined acoustic phonon. Numerical calculations are also achieved for a PQW of GaAs/GaAsAl. The obtained results show that the qPC reaches resonance peaks when investigating its dependence on magnetic field and on frequency of laser radiation. Due to the influence of confined optical phonon, the position of resonance peaks has been not only shifted but also more pronounced than in the case of unconfined optical phonon. Besides, as the amplitude of laser radiation increases, these resonance peaks become higher.

Presenter: Nguyễn Thị Lâm Quỳnh

P.20 – Poster, VCTP-46

Magnon spectrum of the spin-1 J1 –J2 antiferromagnetic Heisenbeberg model

on a triangular lattice

Nguyen Van Hinh (1), Pham Thi Thanh Nga (2) and Nguyen Toan Thang (3)

(1) Hanoi University of Industry, 298 Cau Dien, Bac Tu Liem, Hanoi, Vietnam (2) Thuyloi University, 175 Tay Son, Dong Da, Hanoi, Vietnam (3) Institute of Physics, 10 Dao Tan, Ba Dinh, Hanoi, Vietnam

We study the spin-1 antiferromagnetic Heisenberg model on a triangular lattice with nearest J1 and next-nearest-neighbor J2 exchange interactions. The semifermionic functional integral method with imaginary chemical potential is used in order to exclude the non physical states. Reprensentating the classical ground state by Luttinger-Tisza procedure one may consider the fluctuation contributions to the free energy of the system in the entire range of the coupling parameters. The obtained magnon spectrum is compared with the result of the Green functions Mori's projection operator technique.

Presenter: Nguyen Van Hinh

P.21 – Poster, VCTP-46

Investigation of thermodynamic quantities in some excited nuclei

Le Thi Quynh Huong (1), Nguyen Minh Hien (2), Tran Cong Duy (2), Nguyen Quang Hung (3)

(1) University of Khanh Hoa, (2) Graduate University of Sciences and Technology, Vietnam Academy of Science and Technology, (3) Institute of Fundamental and Applied Sciences, Duy Tan University

The thermodynamic quantities in some excited nuclei are investigated by using extrapolating the experimental level densities. The latest updated nuclear level density (NLD) data below the neutron binding energy B_n is combined with the back-shifted Fermi-gas (BSFG) model for the energy region above B_n. The results obtained indicate that the heat capacities of even nuclei show a more pronounced S-shape than those in odd isotopes. The present work also suggests that the energy-dependent level density parameter in the BSFG formula should be used to obtain the best fit to the NLD data in the whole data range.

Presenter: Le Thi Quynh Huong

P.22 – Poster, VCTP-46

Tomography of partially aligned molecules

Cong-Minh Tran, Khang Tran, Cam-Tu Le, Ngoc-Loan Phan

Ho Chi Minh City University of Education, Ho Chi Minh City, Vietnam

High-order harmonic generation (HHG), emitted from atoms and molecules exposed to an ultrashort intense laser pulse, is rich in structured information. One of the applications of HHG is to reconstruct the highest-occupied molecule orbital (HOMO) of molecules. In many theoretical studies on tomography, the authors have assumed that the molecules are perfectly aligned before interacting with the probe laser [1], [2]. However, with the recent alignment techniques [3], [4] the perfect alignment is impossible to archive [5]. Therefore, considering and clarifying the effect of the partial alignment of molecular samples into the tomography procedure is necessary. To our best of knowledge, this issue is rarely reported. In this report, we study the influence of molecular alignment on the quality of the reconstructed molecular HOMO using HHG form simple molecules N2 and O2. The HHGs are calculated by the semi-classical Lewenstein three-step model [6]. The alignment quality is varied in two ways: (i) using an approximated analytical for-

mula, and (ii) adopting a numerical solution of solving the time-dependent Schrodinger equation for rotating molecules in the alignment laser field. Results show that the molecular HOMO of a molecular sample with a low degree of alignment is less structural due to the averaged effect.

REFERENCES [1] J. Itatani, J. Lavesque, D. Zeidler, H. Niikura, H. Pépin, J. C. Kieffer, P. B. Corkum, and D. M. Villeneuve, Nature 432, 867 (2004). [2] J. C. Kieffer, P. B. Corkum, and D. M. Villeneuve, 432, 1 (2004). [3] M. Qin and X. Zhu, Opt. Laser Technol. 87, 79 (2017). [4] V. H. Le, A. T. Le, R. H. Xie, and C. D. Lin, Phys. Rev. A - At. Mol. Opt. Phys. 76, 1 (2007).[5] M. Lein, R. De Nalda, E. Heesel, N. Hay, E. Springate, R. Velotta, M. Castillejo, P. L. Knight, and J. P. Marangos, J. Mod. Opt. 52, 465 (2005). [6] M. Lewenstein, P. Balcou, M. Y. Ivanov, and A. L. Huillier, 49, 16 (1994).

Presenter: Trần Công Minh

P.23 – Poster, VCTP-46

Multiple rescatterings in harmonic spectra in multicycle midinfrared lasers

Cam-Tu Le (1,2), Ngoc-Loan Phan (3)

(1) Atomic Molecular and Optical Physics Research Group, Advanced Institute of Materials Science, Ton Duc Thang University (2) Faculty of Applied Sciences, Ton Duc Thang University (3) Department of Physics, Ho Chi Minh City University of Education

High-order harmonic generation is one of nonlinear phenomena occurring when atoms/molecules are subjected to intense ultrashort laser [1]. The underlying physics is well described by the three-step model [2] in which an electron is ionized from the atoms/molecules, then accelerated in the laser electric field, and when the electric field reverses its direction, the electron can recombine to the parent ones and emit energetic photon called high-order harmonics. The electron can revisit its parent ion many times before recombining. This can lead to the generation of the pulse train of atto- or even zepto-second timescale [3] that is interesting from theoretical aspect as well as application. This work is to study the multiple rescattering events in the harmonic spectra from hydrogen atom exposed to multicycle midinfrared lasers by solving the time-dependent Schroedinger equation. To uncover the contribution of multiple returns with different laser profiles, we perform the time-frequency analysis based on a synchrosqueezed transform and classical electron trajectories. The results show that the multiple rescatterings strongly depend on the change of the temporal laser profile, such as changing from chirp-free to chirped with different chirped parameters.

References [1] A. McPherson et al., J. Opt. Soc. Am. B 4, 595 (1987). [2] M. Lenwenstein et al., Phys. Rev. A 49, 2117 (1994). [3] C. Hernández-García et al., Phys. Rev. Lett. 111, 033002 (2013)

Presenter: Le Thi Cam Tu

P.24 – Poster, VCTP-46

Numerical calculation of the dependence of the chemical potential on temperature for ideal quantum gases in 1, 2, and 3-dimensional spaces

Hieu B. Le (1), Uyen T. Nguyen (1), Giau N. Nguyen (1), Hieu V. Tran (1), Vinh N. T. Pham (1)

(1) Department of Physics, Ho Chi Minh City University of Education, Ho Chi Minh, Vietnam

In this study, the routines D_QDAGI and Q_ZREAL of IMSL packet are used to numerically

calculate the chemical potentials of ideal quantum gases in 1, 2, and 3-dimensional spaces as functions of absolute temperature. We use the analytical formulae of [J. Low Temp. Phys. (2019) 197,412–444] as benchmarks to validate the accuracy of our results. In vice versa, we can evaluate the applicability of these proposed formulae in low- and high-temperature regimes. The results in this work are initiate for the ongoing project to analytical and numerical calculations of other thermodynamic quantities of ideal quantum gases in 1, 2, and 3-dimensional spaces such as energy, heat capacity, and entropy.

Presenter: Pham Nguyen Thanh Vinh

P.25 – Poster, VCTP-46

Investigate ALP binding mechanism to allele HLA-A*33:03 using Molecular Dynamic simulation

Oanh Phuong Pham (1), Hien T. T. Lai (1), Toan T. Nguyen (1)

(1) VNU Key Laboratory Multiscale Simulation of Complex Systems VNU University of Science, Vietnam National University, Hanoi 334 Nguyen Trai Street, Thanh Xuan, Hanoi 11416, Vietnam

Allopurinol (ALP), a xanthine oxidase inhibitor, is a urate-lowering medication that is FDA approved for the management of gout, prevention of tumor lysis syndrome, and prevention of recurrent calcium nephrolithiasis in patients with hyperuricosuria, has been reported as a common cause of severe cutaneous adverse drug reactions (SCAR) including Stevens-Johnson syndrome (SJS) and toxic epidermal necrolysis (TEN), HSS/DRESS. Some reports proved that allopurinol-induced SCAR has a strong association with HLA-B*5801 that was observed in Han Chinese, Korean and Thai populations with high frequency, while low frequency to European, Japanese. However, as reports by the Bach Mai hospital, although patients do not have the HLA-B*5801 allele, they still had allopurinol-induced SCAR. Very interesting these patients have high frequency with HLA-A*3303 allele (occurred in 10 of 23, 43.5%). So, in this research, we study the effects of ALP on the HLA-A*3303 structure using Molecular Dynamics (MD) simulation methods with three independent replicas. Our results show that all systems HLA-A*3303-ALP are stabled after 100ns simulation time. At the molecular scale, some residues of HLA-A*3303, Val76, Leu81, Ile95, Tyr123 have functions keeping stably its structure in whole simulation and binding to ALP. In addition, ALP has strong interactions with three important residues lived in the active site of HLA-A*3303, containing Asp77, Gln96, Asp116. So, this compound has high binding energy with this allele. From these results, we suggest Asian patients should test alleles HLA-B*5081 as well as HLA-A*3303 before using Allopurinol to avoid drug side effects.

Presenter: Tran Ba Duong

P.26 – Poster, VCTP-46

Study the P-V-T equation of state of copper up to high temperature and pressure

Pham Duy Tan

Research Department, Tank Armour Command, Bac Tu Liem, Ha Noi, Vietnam

P-V-T equation of state of copper up to high temperature and pressure studied by statistical moment method (SMM). We calculate the P-V-T equation of state for copper of the simple form, without adjustment parameters. The numerical results of the pressure as a function of the

compressibility on the copper isotherms, are in good agreement with the values obtained by the previous semiempirical equation of state for copper, at pressure up to 500kbar and temperature up to 2000K. In addition, the expressions for the thermodynamic quantities of copper as simple functions of temperature and pressure are also obtained directly from this equation of state. The numerical results of the thermal expansion coefficient, heat capacity of copper, are in excellent agreement with the experimental data. The P-V-T equation of state of copper obtained in this work can be used as a pressure scale up to 500kbar and temperature up to 2000K.

Presenter: Pham Duy Tan

P.27 – Poster, VCTP-46

Calculation of the acoustomagnetoelectric field in a doped semiconductor superlattice under the influnce of an intense electromagnetic wave

Hoàng Văn Ngọc, Nguyễn Quyết Thắng, Nguyễn Văn Nghĩa, Nguyễn Quang Báu.

Department of Theoretical Physics, Faculty of Physics, VNU University of Science.

The acoustomagnetoelectric (AME) effect has been studied theoretically in a doped semiconductor superlattice (DSS) in the presence of a magnetic field, a constant dc electric field and under the influence of an intense electromagnetic wave (EMW). An analytic expression of the AME field induced by electron-external acoustic wave interaction and electron-internal acoustic phonon (internal acoustic wave) scattering is calculated by using the quantum kinetic equation for electrons. Numerical evaluation for the specific GaAs:Si/GaAs:Be DSS indicates the dependence of the AME field on the temperature T of the system, on the frequency of the external acoustic wave, on the magnetic field B and the characteristic parameter of DSS. Numerical results are compared with those for the bulk semiconductors systems to show the originality of the AME field in DSS. The results obtained are newness and play a crucial part in quantum theory of acoustomagnetoelectric effect in low-dimensional systems.

Presenter: Nguyễn Quyết Thắng

P.28 – Poster, VCTP-46

A new Developement for Prediction of Covid-19 Pandemics

Chu Thuy Anh(1), Nguyen Van Hoa(2), and Nguyen Tri Lan(1)

1) Institute of Physics, Vietnam Academy of Science and Technology, 18 Hoang Quoc Viet, Ha Noi, Viet Nam 2) Faculty of Physics, Hochiminh City University of Education, 280 An Duong Vuong, Hochiminh City, Viet Nam

In previous studies, a modified version of the logistic model with baseline conditions added as an indicator of effective antiviral capacity including that of the community and health system has been proposed and demonstrated. Calculations based on the proposed model have shown that infection rates in the community can be managed and controlled through variation of baseline conditions. However, this simple model has not been able to predict the recurrence of the infection rate when the initial conditions change due to the emergence of new viral strains. In this report, a further investigation of the dependence of the antiviral capacity index on the infection rate and the emergence of new viral strains modeled by the variation of the so-called growth rate is investigated. The results obtained from the calculations on the model allow to explain the "wave phenomenon" of the infection rate during the epidemic of the past two years, the interval between the peaks of infection, and the trend in community immunity due to the

effects of vaccination.

Presenter: Chu Thuy Anh

P.29 – Poster, VCTP-46

Effect of ATP and Colchicine ligands on the NLRP3 – NACHT protein domain

Hien T. T. Lai (1), Do Minh Ha(2,3), Toan T. Nguyen(1)

(1) VNU Key Laboratory Multiscale Simulation of Complex Systems VNU University of Science, Vietnam National University, Hanoi 334 Nguyen Trai Street, Thanh Xuan, Hanoi 11416, Vietnam (2) Faculty of Biology, VNU University of Science Vietnam National University, Hanoi (3) The Key Laboratory of Enzyme and Protein Technology (KLEPT) VNU University of Science, Vietnam National University, Hanoi 334 Nguyen Trai Street, Thanh Xuan, Hanoi 11416, Vietnam

Gout is an extremely painful form of inflammatory arthritis caused by Monosodium Urate (MSU) formation in the joints. While the MSU crystal is one of the triggers for the nucleotide-binding domain (NOD)-like receptor protein 3 (NLRP3) inflammasome (NACHT, LRR, and PYD domains-containing protein 3), it induces caspase-1 activation and non-specific immune responses that cause inflammation. Therefore, structural studies and ligand designs for NLRP3 to make this protein unable to combine with MSU or combine without caspase-1 activation are necessary for Gout treatment. Using computational methods for molecular dynamics (MD) simulations and docking ligands, we study the effect of the activator - Adenosine triphosphate (ATP) to NACHT structural model that is the important domain of NLRP3 protein to active whole NLRP3 inflammasome. And another inhibitor – Colchicine ligand is also docked at the ATP binding pose. Our results show that ATP ligand binds to ATP binding pocket as experimental data, and other binding poses of the NACHT model. And Colchicine ligand can stability at some ATP binding poses with high free binding energies. Our results suggest Colchicine as a candidate ligand to inhibitor the interactive NLRP3 inflammasome through the NACHT binding way and then to Gout treatment.

Presenter: Lai Thi Thu Hien

P.30 – Poster, VCTP-46

Study of SARS-CoV-2 main protease - X77 interaction at molecular scale using Molecular Dynamics Simulation

Tran Ba Duong (1), Lai Thi Thu Hien (1), Nguyen The Toan (1)

(1) Key Laboratory for Multiscale simulation of Complex Systems, Faculty of Physics,VNU University of Science, Vietnam National University

Global health is under heavy threat by a worldwide pandemic caused by SARS-CoV-2 virus (COVID-19). This pandemic was firstly detected at the end of December 2019 at the Wuhan seafood market in China, and quickly spread around the world. According to World Health Organization (WHO), there have been more than 190 million confirmed cases of COVID–19, including more than 4 million deaths all over the world. It has urgently imposed a great concern on the scientific community to find effective solutions to treat this virus. Although the most believed effective solution is vaccine, drug development against COVID-19 has also been necessary. More specifically, drugs are designed to inhibit target 3C-like protease (also called main protease or Mpro), which is responsible for the polyprotein cleavage. One ofthe potential ligands

found in experiment, X77, was able to bind on pocket of Mpro with high affinity,reducing the virus's ability to replicate. However, experimental results have not shown interactions that play a major role in the Mpro- X77 complex at the molecular scale in the physiological environmental condition. Therefore, we investigated the complex Mpro-X77 with three independent replicas of Molecular Dynamic Simulations, then calculate their binding energy using MM/PBSA method. Our results show that the whole protein SARS-CoV-2 Mpro and the X77 ligand are stable. In addition, the X77 ligand hashigh binding energy to this receptor with interactions to important residues THR25, LEU27, MET49,ASN142, CYS145, MET165, PRO168, HIS172, ASP187 and GLN189 that all in the catalytic pocket of the SARS-CoV-2 Mpro structure. These results lead to conclusion that X77 ligand is an effective inhibitor and could be used as a standard reference for the vitural screening and development of drugs for prevention and treatment of diseases caused by the SARS-CoV-2 virus.

Presenter: Tran Ba Duong

P.31 – Poster, VCTP-46

Entanglement dynamics of a two-mode Jaynes-Cummings model interacting with the superposition of photon-added pair coherent states

Le Thi Hong Thanh (1,2), Truong Minh Duc (1)

(1) Center for Theoretical and Computational Physics, University of Education, Hue University, 34 Le Loi, Hue City, Viet Nam (2) Quang Nam University, 102 Hung Vuong, Tam Ky City, Quang Nam Province, Viet Nam

In this paper, we study the dynamical entanglements in the interaction between an effective two-level atom with a two-mode field in the superposition of photon-added pair coherent states. The effect of adding photons on the entanglement degree is investigated. By using the master equation method and the linear entropy criterion in the Jaynes-Cummings model, we find that the degree of entanglement is enhanced. Besides, the dynamical behaviors of this model are found to be different compared to that of the corresponding of pair coherent state.

Presenter: Le Thi Hong Thanh

P.32 – Poster, VCTP-46

Bundle arrangement in toroidal structures of a stiff-polymer chain

Nhung T. T. Nguyen and Trinh Xuan Hoang

Institute of Physics, Vietnam Academy of Science and Technology

Toroidal and rod-like structures are typical collapsed conformations of a single stiff-polymer chain, and are the two most frequently observed morphologies of DNA condensates. In this study, we investigate the arrangement of bundles in toroidal structures of a stiff chain by analytical modeling and replica-exchange molecular dynamics (MD) simulations. The analytical models consider several types of the chain winding within a toroid, namely the twisted bundle, the spool-like and the constant radius of curvature, and seek for the optimal conformation by energy minimization with respect to geometrical parameters of the toroid. The MD simulations are employed for a bead and spring model and are carried out to simulate the chain collapse starting from open conformations. In both methods, we find that the chain tends to adopt conformations akin to those of a twisted bundle within the toroidal structure. It is also indicated that the degree of the twisting decreases with the chain length.

Presenter: Nguyen Thi Thuy Nhung

P.33 – Poster, VCTP-46

Examination of α-induced fusion reactions relevant to the production of p-nuclei

N. Nhu Le (1), N. Ngoc Duy (2), N. Quang Hung (3), (4)

(1) Faculty of Physics, University of Education, Hue University, 34 Le Loi, Hue City 530000, Vietnam (2) Department of Physics, Sungkyunkwan University, Suwon 16419, South Korea (3) Institute of Fundamental and Applied Sciences, Duy Tan University, Ho Chi Minh City 700000, Vietnam (4) Faculty of Natural Sciences, Duy Tan University, Danang City 550000, Vietnam

The present paper examines the effect of temper ature-dependent repulsive core potential on the fusion reac- tions of the α particle relevant to the production of p-nuclei such as 154 Sm, 162 Dy, 166 Er, and 197 Au. For this purpose, the α-nucleus potentials making use of the double folding model with the density-dependent CDM3Y3 interaction plus the temperature-dependent repulsion (CDM3Y3+Repulsion) are employed. In addition, three nuclear level density (NLD) models of Fermi-Gas (FG), Hartree–Fock BCS (HFBCS), and exact pairing plus independent-particle model (EP+IPM) are used to describe the temperature-dependent excitation energy of the compound nucleus produced in the fusion reac- tion. The results obtained show that temperature has a signifi- cant effect on the repulsive core potential, and different NLD models predict different fusion potentials, especially at high temperatures and near the center point (origin) of the interac- tion. Going further away from the origin, the repulsive core potential decreases to approximately zero near the barrier region, while at sufficiently far distances, it is least affected by nuclear temperature. The calculated fusion cross sections using the CDM3Y3+Repulsion potential are only affected by the diffuseness parameter of the repulsive potential arep. in the region above the Coulomb barrier, and a good agree- ment with the experimental data is found at arep. = 0.35 fm. Hence, the effect of repulsive potential on the α-induced reactions is only justified as a correction term, which is added to resolve the Pauli principle problem. This conclusion is in line with those reported previously using similar formalism but for other fusion reactions of heavy nuclei.

Presenter: Nguyen Nhu Le

P.34 – Poster, VCTP-46

Extracting component ratio of HCN-HNC isomers mixing from high-order harmonic generation

Quan-Hao Truong, Ngoc-Loan Phan, Van-Hoang Le

Ho Chi Minh City University of Education, Ho Chi Minh City, Viet Nam

When atoms/molecules are exposed to ultrashort intense laser pulses, the non-linear laser-matter interaction results in high-frequency radiation known as high-order harmonic generation (HHG). Since HHG spectra encode rich information about the target, they are intensively applied to extract the molecular properties [1]. The works [2-4] have shown that HHG spectra emitted from various isomers are completely different, particularly their intensity. These results open a great possibility to determine which isomer in the gas from the measured HHG spectra. On another side, the gaseous state of molecules often exists in the isomer mixing, and the ratio of isomer components is an essential quantity affecting the properties of the gaseous ensemble. This report proposes a method to quantitatively extract the percentage of HCN-HNC isomers

in the mixing costume from the measured HHG spectra. First, we theoretically approach the task by simulating HHG spectra from the molecular ensemble with various component ratios by solving the time-dependent Schrödinger equation. Afterward, we consider the simulated HHG as experimental data with an unknown mixing percentage to perform extracting procedure. We expect to find an analytical relation between the total HHG intensity and the isomer component ratio, which can be useful for the retrieval process. Finally, we can examine the reliability of the method by comparing the extracted component ratio and the data initially input to the HHG simulation. REFERENCES [1] J. Itatani, J. Levesque, D. Zeidler, H. Niikura, H. Pepin, J. C. Kieffer, P. B. Corkum, and D. M. Villeneuve, Nature 432, 1 (2004). [2] N.-T. Nguyen, B.-V. Tang, and V.-H. Le, J. Mol. Struct. THEOCHEM 949, 52 (2010). [3] M. C. H. Wong, J.-P. Brichta, M. Spanner, S. Patchkovskii, and V. R. Bhardwaj, Phys. Rev. A 84, 051403 (2011). [4] A.-T. Le, R. R. Lucchese, and C. D. Lin, Phys. Rev. A 88, 021402 (2013).

Presenter: Truong Quan Hao

P.35 – Poster, VCTP-46

Empirically extracted entropy and heat capacity of heated rotating nuclei

T. Dong Xuan (1,2) and N. Quang Hung (1,2)

1) Institute of Fundamental and Applied Sciences, Duy Tan University, Ho Chi Minh City, Vietnam; 2) Faculty of Natural Sciences, Duy Tan University, Da Nang City, Vietnam

Entropies and specific heat capacities of four heated rotating heavy nuclei (^{184}Re, ^{200}Tl, ^{211}Po, and ^{212}At) are empirically extracted making use of the experimental level density data combined with the conventional angular-momentum dependent back-shifted Fermi gas (BFSG) model. The S-shaped heat capacity, a fingerprint of pairing phase transition, is consequently investigated. Comparison with different microscopic models will be also discussed.

Presenter: Tran Dong Xuan

P.36 – Poster, VCTP-46

Taget-dependent of high-order harmonic generation from atoms in chirp laser pulse

Thanh-Tu Nguyen (1), Cam-Tu Le (2), Ngoc-Loan Phan (1)

(1) Ho Chi Minh City University of Education, (2) Ton Duc Thang University

The interaction of an intense ultrashort laser pulse with atoms or molecules produces various nonlinear phenomena, among these, the high-order harmonic generation (HHG) has been extensively studied in past decades [1]. Using a chirp laser pulse instead of a common periodical one is an effective way to extend the plateau of HHG spectra [2]. In this report, we theoretically study the response of various atomic targets interacting with a chirp laser pulse. The HHG is simulated by solving the time-dependent Schrödinger equation (TDSE). We show that the HHG spectra contain multi plateaus with different cutoffs as indicated in Refs. [3]. More interestingly, this multi-plateau structure strongly depends on the atomic target. To better understand the physical origin of HHG enhancement, we perform semiclassical stimulations of electrons. [1] M. Lewenstein, P. Balcou, M. Y. Ivanov, A. L'Huillier, and P. B. Corkum, "Theory of high-harmonic generation by low-frequency laser fields," Phys. Rev. A, vol. 49, no. 3, pp. 2117–2132, 1994. [2] J. J. Carrera and S. Chu, "Extension of high-order harmonic generation cutoff via coherent control of intense few-cycle chirped laser pulses," Phys. Rev. A, vol. 75, no. 3, p. 033807, 2007. [3] W.

Jie, Z. Zhen, and L. Xue-Shen, "Extension of high-order harmonics and generation of an isolated attosecond pulse in the chirped laser field," Chinese Phys. B, vol. 19, no. 9, p. 093201, 2010.

Presenter: Nguyen Thanh Tu

P.37 – Poster, VCTP-46

Magnetic and electric dipole moments in a TeV scale type-I see-saw model

D. N. Dinh

Institute of Physics, Vietnam Academy of Science and Technology, Hanoi, Vietnam.

Recently, Muon magnetic dipole moment is probed a sizable difference between the experimentally observed result and SM prediction at rather high precision with 4.2σ. This, thus, is another strong evidence for physics

beyond the SM. In this report, we discuss magnetic and electric dipole moments in a TeV scale type-I see-saw model. An investigation for the model to confront with current and future experiments will also be considered.

Presenter: Dinh Nguyen Dinh

P.38 – Poster, VCTP-46

Investigation of R_K and R_K^* anomalies in the minimal flipped 3-3-1 model

D.T. Huong (1) & N.T. Duy (1,2)

(1) Institute of Physics, VAST (2) Graduate of Sciences and Technology, VAST

We study the newest updated LHCb measurements for R_K, and R_K^* ratios in the framework of the minimal flipped 3-3-1 models. In contrast to the ordinary 3-3-1 models, the first lepton generation in the minimal flipped 3-3-1 model is transformed differently from the two remaining ones. We find that the presence of box diagram contributions in the Wilson coefficients C_{9e}^{NP} and C_{10e}^{NP} can explain these anomalies.

Presenter: Nguyen Tuan Duy

P.39 – Poster, VCTP-46

Dark matter in the fully flipped 3-3-1-1 model

Duong Van Loi, Cao H. Nam, Phung Van Dong

Phenikaa Institute for Advanced Study and Faculty of Basic Science, Phenikaa University, Yen Nghia, Ha Dong, Hanoi 100000, Vietnam

We present the features of the fully flipped 3-3-1-1 model and show that this model leads to dark matter candidates naturally. We study two dark matter scenarios corresponding to the triplet fermion and singlet scalar candidates, and we determine the viable parameter regimes constrained from the observed relic density and direct detection experiments.

Presenter: Duong Van Loi

P.40 – Poster, VCTP-46

Diverse Electronic and Magnetic Properties of Fluorine-Adsorbed Silicene Nanoribbons: A Density Functional Theory Study

Tien Dat Vo (1), Duy Khanh Nguyen(2,3)

(1) Department of Physics, College of Natural Sciences, Can Tho University (2) Information Technology Center, Thu Dau Mot University (3) Institute of Applied Technology, Thu Dau Mot University

Diverse electronic and magnetic properties configurations of silicene nanoribbons (SiNRs) induced by fluorine adsorptions are studied using the density functional theory (DFT) calculations. Fluorine adatoms are optimally adsorbed at the top site of SiNRs among the valley, bridge, and hollow sites, regardless of their concentrations and distributions. For single adatom adsorptions, the direct-gap semiconducting behaviors become the p-type metallic behaviors. The metallic-semiconducting transitions of fluorine-adsorbed armchair systems are occurred at the critical adatom concentrations of 50%. The largest band gap of 1.61 eV is found at the 100% adsoption system. The anti-ferromagnetic configuration of pristine zigzag system become the ferromagnetic one in the single adatom-adsorbed zigzag systems. Especially, under the double adatom adsorptions, whether the anti-ferromagnetic configuration becomes ferromagnetic or nonmagnetic ones that strongly depends on the adatom distributions across the zizag edges. The ferromagnetic-nonmagnetic transition of the fluorine-adsorbed zigzag systems is found at the critical concentration of 25%. The diverse electronic and magnetic properties of fluorine-adsorbed silicene nanoribbons will be very potential for future nanoelectronic and spintronic devices.

Presenter: Vo Tien Dat

P.41 – Poster, VCTP-46

Temperature effect on exciton energy spectra of transition-metal dichalcogenides monolayers

Duy-Nhat Ly *(1), Thanh-Truc N. Huynh (2), Ngoc-Hưng Phan (1) and Van-Hoang Le (1)*

(1) Ho Chi Minh City University of Education, Dist. 5, HCMC; (2) Marie Curie High School, Dist. 3, HCMC

Energy spectra of an exciton in transition metal dichalcogenide monolayers (TMDs) have been measured in the laboratory at temperatures below 300 K, where the temperature effect is still essential. This effect has been explained mainly based on exciton-phonon interactions, but there is still a large difference between the experiments and the theoretical estimation [1]. This report presents a new mechanism where the temperature can affect exciton energy due to the magnetic field.

Considering the two-dimensional exciton in the magnetic field perpendicular to the plane the Hamiltonian has the form

$$\hat{H} = \frac{1}{2m}\hat{p}^2 + \frac{e^2B^2}{8m}(x^2+y^2) + V_{h-e}(r) + \frac{\alpha\, eB}{2}\,\hat{l}_z - \frac{1}{M}\left(e\vec{B}\times\vec{P}_0\right).\vec{r} + \frac{1}{2M}{P_0}^2,$$

where we use the notations: the effective masses of the electron and hole m_e, m_h, the exciton reduced mass $m = m_e m_h/(m_e+m_h)$, $M = m_e + m_h$, $\alpha = (m_h - m_e)/m_h m_e$. Here, the quasi-momentum $\vec{P}_0$ of the exciton center of mass is an eigenvalue of the operator $\hat{P}_0 = \hat{P} - e\vec{B}\times\vec{r}/2$ with the momentum operator of the center of mass $\hat{P}$. This quantity is conserved for the considered system. $V_{h-e}(r)$ is the electron-hole interaction described by the Keldysh potential for the exciton in TMD monolayers.

The above Hamiltonian was obtained through a non-trivial process of separating the center of mass from the electron-hole system [2]. In recent works, $\hat{P}_0$ is neglected, and only s-states are

considered when angular momentum is equal to zero, $\hat{l}_z = 0$. However, if we consider excitons as a thermally interacting system, the terms containing $\hat{P}_0$ in the Hamiltonian somehow contribute to the exciton energy and can not be neglected. Here, the relation to temperature is given by ${P_0}^2 = 2M\,k_BT$ with the Boltzmann constant k_B. The temperature-related component of the Hamiltonian has a potential-barrier form, similar to the electric field in the Stark effect, so that the exciton energy will have an imaginary part related to the tunneling probability. Therefore, when calculating the exciton energy spectra, it is possible to calculate the lifetime part contributed by temperature through a new mechanism via the magnetic field. We qualitatively investigate the mentioned effect showing that the thermal motion of the center of mass enhanced by the external magnetic field affects the exciton energy spectra and their level width—the greater the temperature, the bigger the tunneling effect. It can be explained through the bending of the effective potential by the quasimomentum via the magnetic field. Also, the predicted effect is supported by the lasted experiments showing that the width of the spectrum increases with higher values of the magnetic field. Quantitative research will be continued by numerically solving the Schrödinger equation.

[1] A. Arora, et al., Excited-state trions in monolayer WS2, Phys.Rev.Lett. 123 (2019) 167401.

[2] Duy-Nhat Ly, Ngoc-Tram D. Hoang, and Van-Hoang Le, Comment on "Excitons, trions, and biexcitons in transition-metal dichalcogenides: Magnetic-field dependence,"Phys.Rev.B 101 (2020) 127401.

Presenter: Ly Duy-Nhat

P.42 – Poster, VCTP-46

Topological phases in kagome magnets

Tran Thi Thanh Mai, Nguyen Hong Son, and Tran Minh Tien

(1) Faculty of Physics, Hanoi National University of Education, Hanoi, Vietnam (2) Institute of Physics, Vietnam Academy of Science and Technology, Hanoi, Vietnam

Topological phases in kagome magnets are studied within an anisotropic double exchange model on the kagome lattice. The topological phases are detected by the edge states of nano-ribons of the kagome lattice, as well as, by the cross behavior of the zeros of the diagonal Green function. The existence of the gapless edge modes is consistent with the zero's cross. It turns out that the topological insulator only occurs at certain electron fillings, but not at half filling.

Presenter: Nguyễn Hồng Sơn

P.43 – Poster, VCTP-46

Charged excitons or trions in 2D parabolic quantum dots

Nguyen Hong Quang (1) and Nguyen Que Huong (2)

(1)- Institute of Physics, Vietnam Academy of Science and Technology, 18 Hoang Quoc Viet, Cau Giay, Hanoi, Vietnam; (2)- Marshall University, One John Marshall Drive, Huntington, WV, 25701, USA

So far in the literature the terms "charged exciton" and "trion" are often confused with each other and mostly considered as the same. In this work we show this is not the case in 2D quantum dots with a parabolic confinement. By using the unrestricted Hartree-Fock method the energy and binding energy of both charged excitons and trions in 2D parabolic quantum dots are calculated in dependence on the parameters of charge carriers and quantum dot. It

is shown that the binding energies of the charged exciton and the trion behave differently in regard to the ratios of masses and confinements between the electron and hole. The effect of the external magnetic field on the binding energies of charged excitons and trions have been also considered.

Presenter: Nguyễn Hồng Quang

P.44 – Poster, VCTP-46

The second–order correction of the energy of one-dimensional harmonic oscillator influenced by position-dependent perturbed potentials

Duc T. Hoang (1), Thang N. Tran (1), Tuan L. A. Nguyen (1), Khang M. Le (1), Tran Duong Anh-Tai (2), Vinh N. T. Pham (1).

(1) Department of Physics, Ho Chi Minh City University of Education, Ho Chi Minh, Vietnam (2) Quantum Systems Unit, Okinawa Institute of Science and Technology Graduate University, Onna, Okinawa 904-0495, Japan

In this work, the energy of arbitrary state of one – dimensional harmonic oscillator in the perturbed spatially dependent potentials $V_n(x) = \lambda x^2$ has been analytically derived using the time-independent perturbation theory up to second ordered correction. Here, a straightforward approach using the generating functions is taken into account to solve the integrals of the production of two arbitrary-order Hermite polynomials. The analytical formulae are in good agreement with previous studies and are numerically validated by the Lagrange-mesh method.

Presenter: Pham Nguyen Thanh Vinh

P.45 – Poster, VCTP-46

Cylindrical quantum wire : the Quantum photo-stimulated Peltier effect under the influence of confined acoustic phonons.

Hoang Van Ngoc (1), Nguyen Thị Nguyet Anh (2), Tang Thi Dien (2), Do Tuan Long (2) , Nguyen Quang Bau (2)*

(1) Institute of Applied Technology, Thu Dau Mot University, N0 06 Tran Van On, Thu Dau Mot, Binh Duong, Vietnam. (2) Department of Theoretical Physics, Faculty of Physics, VNU University of Science, N0 334 Nguyen Trai, Thanh Xuan, Hanoi, Vietnam.

The Quantum photo-stimulated Peltier effect has been theoretically studied under the influence of confined acoustic phonon in a cylindrical quantum wire with an infinite potential by using the quantum kinetic equation method. In this work, we assume that the electron-confined acoustic phonon scattering is essential. Moreover, the presence of a strong electromagnetic wave (EMW) is also taken into account to determine the influence of confined phonons on the aforementioned effects. We have defined the analytical expressions for the kinetic tensors and the Peltier coefficients (PC). In detailed consideration, the quantum number m was changed in order to characterize the influence of confined acoustic phonon. When setting m to zero, we obtained the results that corresponded to the case of an unconfined phonon. The theoretical results have been numerically evaluated and discussed for the GaAs/GaAsAl quantum wire (CQW). The change of PC in two cases unconfined acoustic phonon and confined acoustic phonon have been found according to augment of EMW frequency. The value of resonant peaks has altered under the influence of phonon confinement. The difference of PC also has been discovered when investigating its dependence on the cyclotron frequency. Furthermore, the PC reduced suddenly when

considering the dependence of PC on the radius of wire and PC on the low temperature. All numerical showed that the magnitude of PC diverse significantly in comparison with unconfined case and doped two – dimensional semiconductor superlattice. This means that the confinement of the phonon affects the Peltier effect quantitatively and qualitatively. These results are new and provide to completing the theory of the Peltier effect in low- dimensional semiconductor systems.

Presenter: Nguyễn Thị Nguyệt Ánh

P.46 – Poster, VCTP-46

The decay of the standard model-like Higgs boson $h \to Z\gamma$ in a G221 model

Nguyen Thi Tham (1), Trinh Thi Hong (2), Le Tho Hue (3)

(1) Department of Physics, Hanoi Pedagogical University 2; (2) An Giang University (3) Institute of Physics, Vietnam Academy of Science and Technology

Decay of SM-like Higgs boson $h \to Z\gamma$ in the G221 model is investigated. We show that new particles predicted by this model may give significant effects to this decay channel of the SM-like Higgs boson. The analytical results are expressed in terms of well-known Passarino-Veltman functions which their numerical evaluations can be generated using LoopTools. Our results are also well stable with different values of s_h, m_h, t_b and m_V. From numerical investigation, some details and properties of this decay are presented. They may be useful for comparing with the experimental results that could be detected in the future.

Presenter: Nguyen Thi Tham

P.47 – Poster, VCTP-46

Controlling the nonsequential double ionization process of argon atom induced by the orthogonal two-color laser pulse

Thu D H Truong (1,2,3), Hanh H Nguyen (3), Mi A Quach (1), Hanh T Tran (3), Huy Q Pham (3) and Vinh N T Pham (3)

(1) University of Science, Ho Chi Minh City, Vietnam; (2) Vietnam National University, Ho Chi Minh City, Vietnam; (3) Ho Chi Minh City University of Education, Ho Chi Minh City, Vietnam

Using the classical three-dimensional ensemble model, we simulate the correlated two-electron momentum distribution induced by the orthogonal two-color laser field consisting of 800-nm and 400-nm pulses. The laser intensities are 2.5×10^{14} W/cm^2. It is found that the recollision time of the first ionized electron strongly depends on the relative phase of two laser pulses which results in the distinction of the correlated two-electron momentum distribution. Therefore, the orthogonal two-color laser pulse plays a crucial role in controlling the nonsequential double ionization process of the atom. In addition, the dependence of ionization mechanisms is also investigated in this work.

Presenter: Truong Dang Hoai Thu

P.48 – Poster, VCTP-46

Boundary-scattering induced Seebeck coefficient enhancement in thin films within relaxation time approximation

*Viet Anh Tran(1), Toan The Nguyen(2), Hung Quoc Nguyen(3), Giang Huong Bach(1)**

(1) Computational Material Science Labs, Faculty of Physics, VNU University of Science, Hanoi, Vietnam (2) Key Labs for Multiscale Simulation of Complex Systems, VNU University of Science, Hanoi, Vietnam (3) Nano and Energy Center, VNU University of Science, Hanoi, Vietnam

We investigate Seebeck coefficient basing on the Boltzmann transport equation of electrons within relaxation time approximation. Using boundary condition along the film thickness of semiconductors, we observed the enhancement of Seebeck coefficient due to electrons elastically scattering on the boundary when the film thickness is reduced, which agrees with experimental observations and theoretical predictions. With this simple approximation, the Seebeck coefficient of the thin film possibly increases about only 10% in comparison with the bulk. The main factor that greatly affects the increase of Seebeck coefficient comes from the quantized energy levels of two-dimensional electron gas in thin films which control carrier concentrations of the system or the chemical potential in the thermodynamic limit.

Presenter: Bach Huong Giang

P.49 – Poster, VCTP-46

Explore the application of reactor neutrino detector to the nuclear safeguard in Vietnam

T. V. Ngoc[1,2], S. Cao[1,3], N. T. Hong Van[4], P. T. Quyen[1,2], N. H. Duy Thanh[1]

[1]*Institute For Interdisciplinary Research in Science and Education, Quy Nhon, Vietnam;* [2]*Graduate University of Science and Technology, Hanoi, Vietnam;* [3]*High Energy Accelerator Research Organization (KEK) , Tsukuba, Ibaraki, Japan;* [4]*Institute of Physics (IOP), VAST, Hanoi, Vietnam*

In this poster, we will investigate the possibility of building a plastic scintillator neutrino detector in Vietnam for nuclear safeguard purposes. The application may be at Da Lat or planned Dong Nai nuclear plants, or at the Vietnam border where there are three nuclear reactor complexes were built and have been operating.

Presenter: Trần Văn Ngọc

P.50 – Poster, VCTP-46

Formation of Two-Dimensional Amourphous hexa Boron nitride by MD simulation

Nguyen Hoang Giang, Vo Van Hoang, Duong Thi Nhu Tranh, Le Nguyen Tue Minh, Nguyen To Nga*

Comp. Phys. Lab, HoChiMinh City Univ. of Technology, Vietnam National University – HoChiMinh City

Boron nitride, a two- dimensional (2D) honeycomb structure material, has been under an intensive investigation by both experiments and computer simulations due to its potential applications in nanotechnology. We have successfully simulated a 2D amorphous hexa-Boron nitride using molecular dynamics simulation. The model contains 6400 atoms (3200 B and 3200 N) and has a fixed length in the z direction which equals to the buckling length of 0.725Å with the elastic reflection behavior boundary. Our simulations suggest that 2D amorphous hexa-boron nitride can be synthesized from the liquid state using Tersoff potential. Here, we find that the glass temperature of model is 5050K. Besides, the radial distribution functions (RDFs), coordination numbers, ring statistics, interatomic distances, and bond-angle distributions are investigated in

detail. We also show the 2D visualization of the atomic configurations.

Acknowledgments This research is funded by Vietnam National University-Ho Chi Minh City (VNU-HCM) under grant number VL2020-20-01.

Presenter: Nguyen Hoang Giang

P.51 – Poster, VCTP-46

Improving of H_2 adsorption via optimized tuning local structure and charge distribution in metal-organic framework Zn-based MOF-74 by Ca doping

Trang Thuy Nguyen(1,2), Phong Hoang Le (1), Nam Hoang Vu (3,4), Linh Nguyen Hoang (5), Tan Le Hoang Doan (2), Jer-Lai Kuo (6), Toan The Nguyen (1), Thang Bach Phan (2,4) and Duc Nguyen-Manh (7)

(1) Key Laboratory for Multiscale Simulation of Complex Systems, University of Science, Vietnam National University – Hanoi, Hanoi, Vietnam; (2) Center for Innovative Materials and Architectures, Vietnam National University Ho Chi Minh City, Ho Chi Minh City, Vietnam; (3) Faculty of Materials Science and Technology, University of Science, Ho Chi Minh City, Vietnam; (4) Vietnam National University, HoChiMinh City, Vietnam; (5) School of Engineering Physics, Hanoi University of Science and Technology, 1 Dai Co Viet road, Hanoi, Vietnam; (6) Institute of Atomic and Molecular Sciences, Academia Sinica, Daan District, Taipei, City 10617, Taiwan; (7) CCFE, United Kingdom Atomic Energy Authority, Abingdon, OX14 3DB, UK.

MOF-74 is one of the best H_2 adsorbing metal organic frameworks (MOF) owing to occurrence of unsaturated metal sites, called open metal sites (OMSs), which are positively charged providing strong electrostatic H_2 attraction. However, the host – guest binding strength is still needed to be further enhanced for efficient hydrogen storage at ambient conditions. In this work, ab-initio electronic structure calculations demonstrate that the hydrogen affinity due to positively charged OMSs is enhanced by the contribution of electron density on various linker fragments including carboxyl group, oxido group and aromatic ring. Introducing Ca^{2+} dopants into Zn-based MOF-74 induces not only local structural distortions but also electron density modulation. The Bader charge analysis shows that the atomic charges of oxygens in the carboxyl and oxido groups slightly increase from -1.76 and -1.62 |e| to -1.77 and -1.64 |e| respectively. Moreover, the larger radius of Ca^{2+} (1.00 Å) in comparison to that of Zn^{2+} (0.74 Å) leads to smaller linker-Zn-O angles which reduces the H2-linker distance, enhancing host-guest binding strength. Consequently, the binding energy near the open Zn^{2+} sites increases by 1.93 kJ/mol comparing with the case without Ca doping.

Presenter: Nguyen Thuy Trang

P.52 – Poster, VCTP-46

Dispersion relations in biased bilayer graphene double-layer structures

Nguyen Van Men (1,2) and Nguyen Quoc Khanh (2,3)

(1) An Giang University - VNU HCM; (2) Vietnam National University Ho Chi Minh City; (3) University of Science - VNU HCM

In this paper, we consider the effects of a perpendicular electrostatic bias on the dispersion relations in a double-layer structure consisting of two parallel bilayer graphene sheets. Calculations are done without temperature effects. We observed that there are two undamped collective

modes in the system in the long-wavelength limit. In comparison with the unbiased case, the collective excitations in biased systems get the smaller frequency in the small wave vector region and become Landau damped in the higher wave vector area. The numerical calculations also demonstrate that as the inter-layer separation changes, the dispersion relations in the biased system behave similarly to those in the unbiased case.

Presenter: Nguyễn Văn Mện

P.53 – Poster, VCTP-46

Bound states of (2 + 1)-dimensional massive Dirac fermions in a Lorentzian-shaped inhomogeneous perpendicular magnetic field

Dai-Nam Le (1,2), Phong-Su Luu (3), Thanh-Sang Ha (3), Ngoc-Hung Phan (3), Van-Hoang Le (3)

(1) Atomic Molecular and Optical Physics Research Group, Advanced Institute of Materials Science, Ton Duc Thang University, Ho Chi Minh City, Viet Nam; (2) Faculty of Applied Sciences, Ton Duc Thang University, Ho Chi Minh City, Viet Nam; (3) Department of Physics, Ho Chi Minh City University of Education, 280 An Duong Vuong Street, District 5, Ho Chi Minh City, Viet Nam

In this study, we investigate massive Dirac fermions in (2 + 1)-spacetime confined by a Lorentzian-shaped inhomogeneous magnetic field and construct solutions of their bound states by both analytical and numerical methods. First, we have found a set of specific magnetic fields which allow obtaining conditionally exact solutions as well as quasi-exact ones. Second, we construct these analytical solutions explicitly and analyse the effect of Dirac fermion's effective mass. We also calculate entire energy spectra for the considered system numerically using Feranchuk–Komarov operator method and combine them with the analytical solutions for investigating Landau quantization in the energy spectrum.

References: [1] Dai-Nam Le, Phong-Su Luu, Thanh-Sang Ha, Ngoc-Hung Phan, and Van-Hoang Le 2020 Physica E 116, 113777; [2] Dai-Nam Le, Van-Hoang Le, and Pinaki Roy 2018 Physica E 96, 17; [3] Dai-Nam Le, Van-Hoang Le, and Pinaki Roy 2018 Physica E 102, 66.

Presenter: Le Dai-Nam

P.54 – Poster, VCTP-46

Structure and Electronic Properties of Germanene Nanoribbons Under Sodium Doping Effect: A DFT Study

Vo Van On, Huynh Thi Phuong Thuy

Institute of Applied Technology, Thu Dau Mot University, Binh Duong, Vietnam

In the paper, the first-principles calculations are carried out to study the structural and electronic properties of sodium-adsorbed germanene nanoribbons (GeNRs) with three configures of the ratio of Na: Ge are 1:12; 1:6, and 1:3. Specifically, the feature-rich properties are determined through the complete theoretical framework developed under the DFT calculations, including the binding energies, optimal lattice parameters, atom-projected band structures, orbital- and atom-projected density of states (DOSs), and charge density distributions. Results show that sodium (Na) adatom favorably adsorbs at the hollow site of GeNRs. The Na-doped systems belong to physical adsorptions due to their binding energies are less than -3 eV, the adsorption energy gets -2.8 eV in the $2\mathrm{Na}_N\mathrm{RGe}$ configuration. The bandgap of the Na-NRGe adsorption system seems

to depend on the adsorption sites of Na on the NRGe substrate, it reaches a minimum of -0.65 eV in the 2Na-NRGe configuration at the hollow site. The feature-rich electronic properties of GeNRs induced by the Sodium adatom doping effect are suitable for various applications in electronic devices.

Presenter: On Van Vo

P.55 – Poster, VCTP-46

Nonperturbative Casimir effect of compact electrodynamics in 2+1 dimensions

Nguyen Huu Ha

Faculty of Pedagogy, Dalat University

We represent a brief result of Casimir effects in compact electrodynamics in two spatial dimensional systems by a nonperturbative approach. Basing a previous paper [3] which examined the Casimir effect between two ideal electric wires, we study the boundaries of the Casimir system under two cases: two wires are ideal magnetic conductors and a mixed system consists of an ideal electric conductor faced with one ideal magnetic one. Consequently, there is the existence of an attractive potential between two ideal magnetic wires meanwhile a repulsive force between mixed systems. We also estimate the contribution of monopole to Casimir energies for two cases to conclude that monopole lowers Casimir energies. Finally, we estimate the phase transition of monopoles to propose that there is an emergence of BKT phase transition from unbinding to binding phases of monopole-antimonopole at a small separation

Presenter: NGUYEN Huu Ha

P.56 – Poster, VCTP-46

Screening AChE-Inhibitor Vina Docking and SMD simulations

Quynh Mai Thai, T. Ngoc Han Pham, Thien-Y Vu , Son Tung Ngo

Faculty of Pharmacy of Ton Duc Thang University

Acetylcholinesterase (AChE) is a key target in the treatment of Alzheimer's disease. It hydrolyzes neurotransmitter acetylcholine resulting a deficiency of acetylcholine in brain and also common cause of Alzheimer's disease. Therefore, in this context, we used combination of computational methods, including molecular docking (Autodock Vina, Autodock 4), fast pulling of ligand (FPL) in Steered-Molecular Dynamics (SMD) simulations to rapidly evaluate binding affinity of Vietnamese compounds to AChE, thereby investigating potential inhibitors of AChE. First, we tested our approach with ten experimental substances to prove that our calculation results were reasonable. Then we applied our approach on a databases of 4578 natural compounds and preliminarily screened 21 natural compounds by Autodock Vina. Finally, the docking conformations of complexes are starting conformations of SMD simulation. FPL calculations determination of the relative binding affinities of a large number of AChE inhibitors as to confirm the relative binding affinity of AChE inhibitors. In addition, the pharmacokinetic and pharmacological information of the inhibitor candidates can also be determined by other computational tools such as PreADMET, thereby generating a list of potent inhibitory compounds such as can be easily absorbed from the intestinal tract, low toxicity, can cross the blood-brain barrier, etc. Overall, Our obtained results may stimulate the search potentials drugs for an Alzheimer's disease therapy.

Presenter: Thai Quynh Mai

P.57 – Poster, VCTP-46

In silico screening of potential β-secretase (BACE1) inhibitors from VietHerb database

Nguyen Thao Nhung (1), Nhung Duong (2,3), Huong Thi Thu Phung (1), Quan V. Vo (4), Nguyen Minh Tam (5,6)

(1) NTT Hi-Tech Institute, Nguyen Tat Thanh University, Ho Chi Minh City, Vietnam; (2) School of Biotechnology, International University, Ho Chi Minh City, Vietnam; (3) Vietnam National University, Ho Chi Minh City, Vietnam; (4) Faculty of Chemical Technology - Environment, The University of Danang - University of Technology and Education, Danang, Vietnam; (5) Computational Chemistry Research Group, Ton Duc Thang University, Ho Chi Minh City, Vietnam; (6) Faculty of Applied Sciences, Ton Duc Thang University, Ho Chi Minh City, Vietnam

β-secretase (BACE1), a crucial element in Alzheimer's disease (AD) athogenesis, is an attractive drug target for AD since associating with the generation of Amyloid beta (Aβ) peptides. However, there has been no drug or other interventions that can successfully treat AD to date. In this study, an investigation on the potential inhibitors of BACE1 using accurate and precise computational approaches was carried out. The binding affinities to BACE1 of several thousand natural compounds were preliminary predicted using Autodock4 package. A shortlist of 20 compounds forming the largest docking energy to BACE1 were then refined using steered molecular dynamics (SMD) simulations. The obtained results revealed that three compounds including quercetin 3-O-neohesperidoside, hydroxysafflor yellow A, and myricetin 3-O-(3"-galloylrhamnopyranoside) possessed the remarkably higher binding affinities than that of the well-known inhibitor of BACE1. Therefore, these natural compounds can be the very promising inhibitors of BACE1.

Presenter: Nguyen Thao Nhung

P.58 – Poster, VCTP-46

Significant enhancement of optical absorption of a monolayer graphene inside an optical microcavity

Vinh N.T. Pham (1), Chu Manh Hoang (2), Le Tri Dat (3,4), and Nguyen Duy Vy (3,4,), Takuya Iida (5)*

(1) Ho Chi Minh City University of Education, Ho Chi Minh City 748342, Vietnam; (2) International Training Institute for Materials Science, Hanoi University of Science and Technology, Hanoi 10000, Vietnam; (3) Laboratory of Applied Physics, Advanced Institute of Materials Science, Ton Duc Thang University, Ho Chi Minh City 756636, Vietnam; (4) Faculty of Applied Sciences, Ton Duc Thang University, Ho Chi Minh City 756636, Vietnam; (5) RILACS, Osaka Prefecture University, Osaka 599-8570, Japan. (*) nguyenduyvy@tdtu.edu.vn

The natural optical absorption of a monolayer graphene is about 2.3% and enhancement of this absorption is of significant interest. In this talk, we present the possibility of increasing the absorption by using the optical microcavity (OMC). The enhancement of the optical field inside the cavity could enhance the optical density on the graphene surface. The analytical calculation shows that the absorption is greatly enhanced, up to several orders in magnitude. This result could help experimentalist obtaining other interesting phenomena in graphene layer. Further studies could be adopted for multilayer graphene and the dependence of the OMC optical

properties on the position and orientation of the graphene layer.

Presenter: Nguyen Duy Vy

P.59 – Poster, VCTP-46

Ab-initio Calculations of Water Adsorption on Graphene: The role of the Substrate Materials

Viet Bac T. Phung (1), Van An Dinh (2)

(1) Institute of Sustainability Science, VNU Vietnam Japan University, Luu Huu Phuoc street, My Dinh, Nam Tu Lien, Hanoi, Vietnam (2) Osaka University, 2-1 Yamadaoka, Suita, Osaka 565-0871, Japan

Humidity sensors have attracted much attentions due to their various applications in environment monitoring and health care. Graphene has been found as a promising humidity sensing material because of its good hydrophilicity and high sensitivity. In this study, the adsorption characteristics of H2O onto the surface of the pristine graphene and onto graphene supported on different substrates such as h-BN, SnO2, GaAs are investigated using density functional calculations. The bonding of H2O to graphene has been characterized as physisorption. We use the band structure calculations and density of states analysis to study the influence of substrates in the electronic structure of graphene and the water adsorption properties of the graphene. Our calculations reveal that H2O acts as a weak acceptor, it receives electrons from graphene. The charge transfer between H2O and the graphene/substrates leads to the shift in the Fermi energy and should modify the electronic structures of the graphene surface. The introduction of considered substrates effects to the charge transfer between graphene and H2O and the workfunction. The presence of different substrates such as h-BN, SnO2, GaAs increases the adsorption energy of H2O on graphene up to 20%. This study could potentially be useful in developing graphene-based flexible humidity sensors .

Presenter: Phung T. V. Bac

P.60 – Poster, VCTP-46

Probing the permanent dipole moment of polar molecule from high-oder harmonic generation

Kim-Ngan H. Nguyen(1), Ngoc-Loan Phan(1), Cam-Tu Le(2), Van-Hoang Le(1)

(1) Ho Chi Minh City University of Education, Ho Chi Minh City, Vietnam; (2)Ton Duc Thang University, Ho Chi Minh City, Vietnam

When an atom or symmetric molecule interacts with the ultrashort intense laser pulse, they emit high-order harmonics with only odd order. Meanwhile, for the polar molecules characterized by their permanent dipole, the HHG possesses both odd and even harmonics [1-2]. Our previous study [3] examined the ratio between adjacent even and odd harmonics (called the even-to-odd ratio) in relationship with the permanent dipole moment. We have found that the even-to-odd ratio strongly depends on the nuclear-charge ratio of the two molecular nuclei and the permanent molecular dipole. In addition, we have pointed out that the found dependence has the form of hysteresis curves. This sensitivity of the even-to-odd ratio to the permanent molecular dipole suggests developing a tool to extract permanent molecular dipole from the odd-even HHG data. For this purpose, first, we theoretically approach the task by simulating the HHG spectra from diatomic asymmetric molecules using the numerical method of solving the time-dependent

Schrödinger equation. For simplicity, we use the Z_1Z_2 model of polar molecules. Afterward, we investigate the HHG spectra of a polar molecule with different intramolecular distances and, thus, diverse permanent dipole moments. We expect to find a relationship between the even-to-odd ratio and the permanent dipole moments. We will also examine the stability of this relation on various parameters of the laser pulses. Finally, using the found relationship, we extract the permanent dipole from the HHG data and examine the validity of the method by comparing it with the initial input data while simulating the HHG spectra. Reference [1] P. M. Kraus, A. Rupenyan, and H. J. Wörner, "High-harmonic spectroscopy of oriented OCS molecules: Emission of even and odd Harmonics", Phys. Rev. Lett. 109, 233903 (2012). [2] N. L. Phan, C. T. Le, V. H. Hoang, and V. H. Le, "Odd-even harmonic generation from oriented CO molecules in linearly polarized laser fields and the influence of the dynamic core-electron polarization", Phys. Chem. Chem. Phys. 21, 24177 (2019). [3] Kim-Ngan Nguyen-Huynh, Cam-Tu Le, Hien T. Nguyen, Lan-Phuong Tran, Ngoc-Loan Phan, "Effect of molecular charge asymmetry on even-to-odd ratio of high-order harmonic generation", Communications in Physics 30, No. 3, pp. 197-208 (2020).

Presenter: Nguyen Huynh Kim Ngan

P.61 – Poster, VCTP-46

Magnetic excitations in the S=1 two-dimensional Kitaev-Heisenberg model

Pham Thi Thanh Nga (1), Nguyen Van Hinh (2) and Nguyen Toan Thang (3)

(1) Faculty of Electrical and Electronics Engineering, Thuyloi University, 175 Tay Son, Dong Da, Hanoi, Vietnam; (2) Department of Fundamental Science, Ha Noi University of Industry, 298 Cau Dien, Bac Tu Liem, Hanoi, Vietnam; (3) Institute of Physics, VAST, 10 Dao Tan, Ba Dinh, Hanoi, Vietnam. E-mail: nga_ptt@tlu.edu.vn

We study the S=1 two-dimensional Kitaev-Heisenberg model, which may be relevant to 2D Mott insulators with strong spin-orbital couplings in layered transition metal oxides. The auxiliary fermionic representation of the spin operators within a functional integral formalism with an imaginary Lagrange multiplier is employed to retain an exact constraint of single particle occupancy. We derived the magnon spectrum and transition temperature in one-loop approximation. The results are compared with the S=1/2 case as well as with the Holstein-Primakov linear spin wave theory results.

Presenter: Pham Thi Thanh Nga

P.62 – Poster, VCTP-46

$Na_2V_3(SO_4)_4$ - a promising cathode material of SIB batteries

Thien Lan Tran (1), Viet Bac Phung (2), and Van An Dinh (3)*

(1) Department of Physics, Hue University of Education, Hue University, 34 Le Loi St., Hue, Vietnam (2) Institute of Sustainability Science, VNU Vietnam Japan University, Luu Huu Phuoc St., My Dinh I, Hanoi, Vietnam (3) Department of Precision Engineering, Graduate School of Engineering, Osaka University, 2-1 Yamadaoka, Suita, Osaka 565-0871, Japan

In this report, based on the Density Functional Theory we propose a new cathode material $Na_2V_3(SO_4)_4$ for SIB batteries. The crystal structure, electronic structure, open-circuit potential, polaron formation in the defected structure, and the possible diffusion processes are explored by the method GGA+U with $U_{\text{eff}} = 3.5$ eV. Diffusion processes are investigated systematically with considering the simultaneously migration of accompanying polarons of Na-vacancies [1].

Results depict that with the crystal structure refined in the $Cmc2_1$ group [2], the compound posseses a bandgap of 2.38 eV, a redox potential of 3.35 V and an activation energy of 686 meV. With the relatively high redox potential and low activation energy, $Na_2V_3(SO_4)_4$ is expected to be a promising cathode material for SIB batteries. [1] Dinh, V. A. et al. Appl. Phys. Express 5 (2012) 045801. [2] Gao, J. et al; J. Mat. Chem. A 4 (2016) 11870.

Presenter: Trần Thiện Lân

P.63 – Poster, VCTP-46

Topological Green function of interacting systems

Tran Thi Thanh Mai, Nguyen Duong Bo, Nguyen Hong Son, Tran Minh Tien

Institute of Physics, Vietnam Academy of Science and Technology, Hanoi, Vietnam

We construct a Green function, which can identify the topological nature of interacting systems. It is equivalent to the single-particle Green function of effective non-interacting particles with the Bloch Hamiltonian given by the inverse of the full Green function of the original interacting particles at zero frequency. The topological nature of the interacting insulators is originated from the coincidence of the poles and the zeros of the diagonal elements of the constructed Green function. The cross of the zeros in the momentum space closely relates to the topological nature of insulators. As a demonstration, using the zero's cross, we identify the topological phases of magnetic insulators, where both the ionic potential and the spin exchange between conduction electrons and magnetic moments are present together with the spin-orbital coupling. The topological phase identification is consistent with the topological invariant of the magnetic insulators. We also found an antiferromagnetic state with topologically breaking of the spin symmetry, where electrons with one spin orientation are in topological insulating state, while electrons with the opposite spin orientation are in topologically trivial one.

Presenter: Tran Thi Thanh Mai

P.64 – Poster, VCTP-46

Enhancing absorption of graphene layer using an optical microcavity graphene

Luong Hoang Sang (1), Le Tri Dat (2), Nguyen Duy Vy (2)

(1) Ho Chi Minh City University of Education, Vietnam; (2) Ton Duc Thang University, Ho Chi Minh City, Vietnam

Recently, several studies have used enhancing the electric field to raise the absorption of a graphene layer. In our previous work, we applied an optical microcavity (OMC) to rise the electric field in a system. Here, we investigated the electric fields in the OMC that is made of two gold layers distanced by LOMC and inserts into a graphene layer inside it. The obtained results showed that the electric field intensity is changed when the graphene layer is located in various positions. Besides, some optical properties such as absorption, reflection, and transmission can be revealed.

Presenter: Le Tri Dat

P.65 – Poster, VCTP-46

Partial level scheme of ^{182}Ta obtained from ^{181}Ta(n,2γ) experiment: preliminary results

Nguyen Ngoc Anh (1), Nguyen Xuan Hai (1), Nguyen Quang Hung (2, 3), Le Tan Phuc (2, 3), Le Thi Quynh Huong (4), Dinh Thi Tuong Quy (4), Cao Minh Nhan (4)

(1) Dalat Nuclear Research Institute, Vietnam Atomic Energy Institute, 01 Nguyen Tu Luc, 670000, Dalat City, Vietnam; (2) Institute of Fundamental and Applied Sciences, Duy Tan University, 700000, Ho Chi Minh City, Vietnam; (3) Faculty of Natural Sciences, Duy Tan University, 550000, Danang City, Vietnam; (4) Department of Natural Science and Technology, Khanh Hoa University, 650000, Nha Trang City, Khanh Hoa Province, Vietnam

A sample of ^{181}Ta has been irradiated with thermal neutron produced by the Dalat Nuclear Research Reactor in order to create ^{182}Ta compound nuclei, whose excitation energy is approximately equal to the neutron binding energy. The ^{182}Ta compound nuclei deexcite to the ground state by emitting gamma transitions. The latter have been measured by a $\gamma - \gamma$ coincidence spectrometer [1], which, in fact, only detect two-step gamma cascades. From the measured two-step gamma cascades, we have constructed a partial level scheme of ^{182}Ta, which consists of two-step gamma cascades corresponding to 8 different final levels, namely 0.0 (3^-), 16.27 (5^+), 97.83 (4^+), 114.31 (4^-), 150.150 (4^+), 173.237 (5^-), 237.28 (5^-), 292.93 (5^-) keV ones. All the detected levels are in agreement with those presented in the Evaluated Nuclear Structure Data File (ENSDF) library [2]. It, thus, confirms the validity of many data that currently exist in the ENSDF library. In addition, a large number of gamma transitions emitted from these detected levels to well-known low-lying states, which do not currently exist in the ENSDF library, are found. The possibility of considering these transitions found as the new data is discussed in the present report.

References [1] Khang et al., Nuclear Instruments and Method A 634 (2011) 47-51.
[2] https://www.nndc.bnl.gov/ensdf/

Presenter: Nguyen Ngoc Anh

P.66 – Poster, VCTP-46

Influence of Coulomb disorder on the phase diagram of the Anderson-Hubbard model

Nguyen Thi Hai Yen, Hoang Anh Tuan and Le Duc Anh

Institute of Physics

We study the half-filled Hubbard model with Anderson and Coulomb disorder by mean of dynamical mean field theory using the geometrically averaged local density of states. The paramagnetic phase diagram of the model at zero temperature as a function of the Coulomb interaction and Anderson disorder strength is obtained. The influence of Coulomb disorder on the correlated metal, Mott and Anderson insulator phases is considered and discussed.

Presenter: Nguyen Thi Hai Yen

P.67 – Poster, VCTP-46

The one-loop order contributions of the cLFV decays in 331ISS model.

Ha Thanh Hung (1), Tran Trung Hieu (1)

(1) Department of Physics, Hanoi Pedagogical University 2, Phuc Yen, Vinh Phuc, Vietnam

Within the framework of the 331 ISS model, the main components that make up the one-loop order of cLFV are produced by neutrinos, Higgs and Gauge bosons. These contributions interfere with each other to create regions of parameter space that satisfy the recent experimental limits

of cLFV decays.

Presenter: Ha Thanh Hung

P.68 – Poster, VCTP-46

Magnons in a monolayer honeycomb spin lattice

Niem T. Nguyen(1), Giang H. Bach (1), Thao H. Pham (2), Cong T. Bach (1)

(1) VNU University of Science, 334 Nguyen Trai Street, Hanoi City, Vietnam; (2) University of Education, Hue University, 34 Le Loi Street, Hue City, Vietnam

Theory for elementary excitations (Magnons) in the 2D honeycomb spin lattice is developed using the functional integral method and the XZ Heisenberg model up to next- nearest neighbor site-spin interactions. General temperature- & field-dependent magnon spectra are obtained within the functional Gaussian approximation (equivalent to the RPA) and available for the ferro-, ferri- and antiferromagnetic honeycomb spin lattice structures. Comparisons with other theories of the ferro- and antiferromagnetic Dirac Magnons are discussed.

Presenter: Nguyen Tu Niem

P.69 – Poster, VCTP-46

Oxygen vacancy induced insulator-metal transition in LaNiO3 ultrathin films

Huy Duy Nguyen (1), Cong Thanh Bach (1), Yoshitada Morikawa (2)

(1) VNU University of Science, 334 Nguyen Trai, Thanh Xuan, Ha Noi, Vietnam (2) Osaka University 2-1, Yamada-oka, Suita, Osaka 565-0871, Japan

The field of nickelates is a vivid one and recent debate about the intriguing insulator-metal transition in LaNiO3 thin films has triggered much attention [1]. Despite tremendous effort in describing the inherent mechanism, the physics of the insulating phase remains elusive. In addition, the lack of theoretical and explicit works on LaNiO3 thin films, instead of LaNiO3-based heterostructures as in the majority of publications, makes the study of the transition difficult. Recently, x-ray absorption spectroscopy results have revealed that, when the LaNiO3 films are thin and insulating, a large amount of Ni2+ is observed instead of the formal Ni3+ in thick and metallic films, and the emergence of Ni2+ is closely related to the insulator-metal transition. Indeed, our previous study has pointed out that the addition of one LaO layer on top of the 1.0-unit-cell-thick LaNiO3 film results in the formation of Ni2+ and the insulating ground state [2].

In this study, we employ first-principles study of LaNiO3 thin films on SrTiO3 substrate to demonstrate that Ni2+ is also promoted by the oxygen vacancy and the oxygen vacancy is likely an important factor in driving the insulator-metal transition. In detail, an insulating ground state, as a result of the large exchange and Coulomb interactions, is found for the 1.0-unit-cell-thick LaNiO3 film with an oxygen vacancy. The obtained energy gap of 1.2 eV is much larger than that predicted by previous publications, and is in good agreement with the results of photoemission spectra. On the other hand, the metallic state is quickly recovered for oxygen deficient films with 2.0 or larger unit cell thickness because of the negative charge transfer energy.

The thermodynamic study reveals that the oxygen vacancy may stabilize the LaNiO3 film so as the oxygen vacancy-induced insulating 1.0-unit-cell-thick LaNiO3 film is the preferable structure when the film is ultrathin. In addition, the small calculated formation energy of 0.26 eV for the oxygen vacancy indicates that the insulating 1.0-unit-cell-thick LaNiO3 film may survive even

the annealing process [3]. Finally, work functions of films with various surfaces are discussed.

References [1] P. D. C. King, H. I. Wei, Y. F. Nie, M. Uchida, C. Adamo, S. Zhu, X. He, I. Božović, D. G. Schlom, and K. M. Shen, Nat. Nanotechnol. 59, 443 (2014). [2] H. D. Nguyen, B. T. Cong, and Y. Morikawa, J. Phys.Soc. Jpn. 87, 114704 (2018). [3] H. D. Nguyen, C. T. Bach, and Y. Morikawa, Phys. Rev. B 102, 165411 (2020).

Presenter: Nguyen Duy Huy

P.70 – Poster, VCTP-46

Electronic and thermoelectric properties of ZnO under the adsorption of lung cancer-related gases: first-principle study

Phan Thi Hong Hoa, Do Ngoc Son

Ho Chi Minh City University of Technology, VNU-HCM

Cancers release certain gases in the patient's breath. Therefore, early-stage and non-invasive diagnosis via gas sensors has attracted much attention from researchers. ZnO is a potential sensor material; however, there is no study available to clarify the electronic and thermoelectric properties of ZnO for the gas detection of lung cancer. By the density functional theory calculations, we clarified the properties of ZnO upon the adsorption of gases such as hexane, aniline, ...

Presenter: Phan Thi Hong Hoa

P.71 – Poster, VCTP-46

Efficient Theoretical Approach for the Structural Relaxation Process of Amorphous Drugs under Various Thermodynamic Conditions

Tran Dinh Cuong (1) and Anh D. Phan (1,2)

(1) Faculty of Materials Science and Engineering, Phenikaa University, Hanoi 12116, Vietnam; (2) Phenikaa Institute for Advanced Study (PIAS), Phenikaa University, Hanoi 12116, Vietnam

Recently, amorphous drugs have aroused intense interest due to their superior solubility and bioavailability. However, the molecular dynamics in the amorphous state have remained enigmatic. Herein, we develop a simple method to gain insights into the molecular mobility of these pharmaceutical products. Specifically, the structural relaxation process is described as a universal coupling between local and cooperative activated events. On that basis, thermal and compression effects are appropriately taken into account via the volume expansion. This strategy allows us to reproduce available experimental data with a minimal computational cost. Our theoretical findings would be useful for enhancing the physical stability of amorphous materials.

Presenter: Tran Dinh Cuong

P.72 – Poster, VCTP-46

The possible coexistence of crystalline density modulation and super-fluidity with soft-core bosons in the optical lattice

*Oanh Kim Thi Nguyen(1), Long Dinh Dang(2), Cong Thanh Bach(3), Giang Huong Bach(3)**

(1) Electric Power University, 235 Hoang Quoc Viet street, Bac Tu Liem, Hanoi, Vietnam (2) University of Engineering and Technology, Vietnam National University, 144 Xuan Thuy, Cau Giay, Hanoi, Vietnam (3) Computational Material Science Labs, Faculty of Physics, VNU

University of Science, 334 Nguyen Trai, Thanh Xuan, Hanoi, Vietnam

Supersolid is the fantastic state of matter in which the two properties are that crystalline and flow without friction exist together. In the maturing of ultracold atom experiments in an optical lattice, the evidence of supersolid phase is more and more apparent. Stemming from that motivation, we examine the possible phases of soft-core bosons in the optical lattice by applying the Bose-Hubbard model of a two-dimensional square lattice under an application of a periodic external potential to trap the particles into stripe configurations. Using quantum Monte Carlo simulation with Worm algorithm, we have found three different types of charge-density-wave (CDW) orders at commensurate particle densities, which are 1/2, 1, and 3/2, with the support of a pinning potential and on-site repulsive interaction. We also figure out the coexistence of superfluidity and density modulation near the commensurate fillings.

Presenter: Nguyen Oanh

P.73 – Poster, VCTP-46

Computer simulation of glassy network structure of B2O3-2SiO2 and Al2O3-2SiO2 systems

Mai Thi Lan(1), Pham Tri Dung(2), Nguyen Van Hong(1)

(1)Hanoi University of Science and Technology, 01 Dai Co Viet st, Hai Ba Trưng, Hanoi, Vietnam; (2)Naval Academy, 30 Tran Phu st, Nha Trang, Khanh Hoa province, Vietnam.

Network structure of B2O3-2SiO2 and Al2O3-2SiO2 systems (abbreviated as BS2 and AS2, respectively) in liquid state is investigated by molecular dynamics simulation. For BS2 system, most of basic structure units is BO3 and SiO4, the number of BO4 and SiO5 is very small. For AS2 system, most of basic structure units is TO4 (T=Al, Si). The number of TO3 and TO5 is not much. The topology of basic structural units is investigated via bond angle and bond length distribution. The network structure is stu through linkages T-O-T (T=Si, B, Al) and Qn (Q is SiO4 and n is the number of bridging oxygen (BO) in SiO4 units). Specially, the polyamorphism as well as structural and compositional heterogeneities are also presented and discussed in detail.

Presenter: Mai Thi Lan

P.74 – Poster, VCTP-46

Exact one-loop contributions to the decay $H \to \nu_l \bar{\nu}_l \gamma$

Khiem Hong Phan (*) , Dzung Tri Tran (**) and Le Tho Hue (***)

(*) Institute of Fundamental and Applied Sciences, Duy Tan University, Ho Chi Minh City 700000, Vietnam Faculty of Natural Sciences, Duy Tan University, Da Nang City 550000, Vietnam (**) University of Science Ho Chi Minh City, 227 Nguyen Van Cu, District 5, HCM City, Vietnam - Vietnam National University Ho Chi Minh City, Linh Trung Ward, Thu Duc District, HCM City, Vietnam (***) Institute of Physics, Vietnam Academy of Science and Technology, 10 Dao Tan, Ba Dinh, Hanoi, Vietnam

Exact one-loop contributions to the decay $H \to \nu_l \bar{\nu}_l \gamma$ with $l = e, \mu, \tau$ within standard model framework are presented in this paper. The computations are checked numerically by verifying ward identity and confirming the ultraviolet finiteness of the results. We find that the results satisfy ward identity and are good stability with varying ultraviolet cutoff parameter. Analytic results for form factors of the decay processes are then expressed in terms of Passarino-Veltman coefficient functions which they can be evaluated numerically by using package `LoopTools`. In

phenomenological results, we studied the partial decay widths for the decay channels in both cases of the detected photon and invisible photon. Differential decay widths are also generated as a function of energy of final photon.

Presenter: Trần Trí Dũng

P.75 – Poster, VCTP-46

Charge-mass formula for gauge bosons

Dao Vong Duc

Institute of Physics, VAST

On the base of the proposed mechanism for charge creation from Extradimensions and the conception of deformed gauge invariance /DV Duc, NM Giao, Int. J. Theor. Phys. (2016) 55, 959; DV Duc et al., Modern Phys. Lett. A (2019) 33, 1950130; DV Duc, NM Giao, US Adv. Phys. J. (2014) 1, 1/ we consider a mechanism for the gauge bosons to acquire mass independently of Higgs mechanism. The formalism allows the possibility for gauge interaction charge to be variable in space-time. It is shown that the mass of gauge boson is closely related to the variability of gauge interaction charge and a formula has been derived for that relation. In the special case of constant charge the obtained results are reduced to the traditional ones.

Presenter: Dao Vong Duc

P.76 – Poster, VCTP-46

Study the melting temperature of copper and silver up to high pressure

Pham Duy Tan

Research Department, Tank Armour Command, Bac Tu Liem, Ha Noi, Vietnam

Melting temperature of copper and silver up to high pressure are studied based on Lindemann's melting criterion, where the mean square deviation of the thermal vibrations of the lattice and spacing parameters calculated by the statistical moment method (SMM). We obtain the melting temperatures of these metals are simple explicit functions of pressure, without adjustment parameters. Numerical results of the melting temperatures of copper and silver up to 1500kbar are in excellent agreement with the experimental data and are compared with results calculated by other theories.

Presenter: Pham Duy Tan

P.77 – Poster, VCTP-46

Study of the dynamics of amyloid formation using a Go-like model

Trinh Xuan Hoang and Nhung T. T. Nguyen

Institute of Physics, Vietnam Academy of Science and Technology

β-amyloid peptides are implicated in Alzheimer's disease by forming aggregates called amyloid fibrils. Here, we use a coarse-grained structure-based Go-like model to study amyloid fibril formation with molecular dynamics simulations. The model consists of Go-like potentials for both intra- and inter-chain contacts in a given fibril structure. We applied the model to the fibril of 40-residue Aβ_{1-40} peptides whose structure has been experimentally determined and studied the thermodynamics and the kinetics of fibril formation for various system sizes. The simulations

show that aggregation follows the standard nucleation-growth mechanism. It is indicated that for beta amyloid, nucleation starts with a cluster of 3 peptides and proto-fibrils are formed and grown to a certain size before they stack into a more mature fibril filament.

Presenter: Trinh Xuan Hoang

P.78 – Poster, VCTP-46

Full next-to-leading order QED prediction for electron muon elastic scattering

Le Van Cuong (1,2), Le Duc Ninh (1), Le Duc Truyen (1)

(1) Institute For Interdisciplinary Research in Science and Education, ICISE, Quy Nhon, Vietnam; (2) University of Science, VNUHCM, Ho Chi Minh city, Vietnam

Recently, the MuonE experiment has been proposed as a new method to measure precisely the running of fine-structure electromagnetic coupling in the space-like region via the electron muon elastic scattering. This will help to resolve the 4.2 sigma discrepancy between the Standard Model prediction and the currently combined experimental measurement for the muon anomalous magnetic moment. For the MuonE experiment, the colliding energy is about 0.4 GeV, the effects of electromagnetic interaction are completely dominant. To achieve the required precision level of 10 ppm, next-to-next-to-leading order (NNLO) QED prediction is mandatory. In this work, we present our full next-to-leading order QED prediction for the the cross-section, utilizing the high-precision Monte-Carlo programs VEGAS+ and BASES for numerical calculation. This is an important step towards the full NNLO results.

Presenter: Lê Văn Cường

P.79 – Poster, VCTP-46

Anderson localization on the Anderson-Hubbard model with spatially alternating interactions

Hoang Anh Tuan (1), Nguyen Thi Hai Yen (1) and Le Duc Anh (2)

(1) Institute of Physics, Vietnam Academy of Science and Technology (2) Hanoi National University of Education

We investigate the metal-insulator transitions in the half-filled Anderson-Hubbard model with spatially alternating interactions within the framework of the typical medium theory.The equations determining the boundary between the correlated metal, Mott and Anderson insulators are derived and the ground state phase diagrams of the system are obtained. We find that with increasing the interaction asymmetry the metal region in the phase diagram is reduced, while both Mott and Anderson insulator regions are enlarged.

Presenter: Hoang Anh Tuan

List of Participants

Bach Huong Giang
VNU University of Science
Email: gbach@hus.edu.vn

Bach Thanh Cong
Faculty of Physics, VNU University of Science
Email: congbachthanh@gmail.com

Cao Hoang Nam
Phenikaa University
Email: nam.caohoang@phenikaa-uni.edu.vn

Cao Huy Phương
Hung Vuong University
Email: caohuyphuongvlpt@yahoo.com.vn

Cao Minh Nhan
Graduate University of Sciences and Technology
Email: minhnhan379079@gmail.com

Cao Thi Bich
Institute of Physics, Vast
Email: ctbich@iop.vast.ac.vn

Chu Thuy Anh
Institute of physics, VAST
Email: ctanh@iop.vast.ac.vn

Dao Thi Nhung
IFIRSE
Email: dtnhung2008@gmail.com

Dao Vong Duc
Institute of Physics, VAST
Email: dvduc@iop.vast.ac.vn

Dinh Nguyen Dinh
Institute of Physics, Hanoi
Email: dndinh@iop.vast.ac.vn

Đinh Thị Tường Quy
Viện Vật Lý
Email: dinhtuongquy1998@gmail.com

Do Quoc Tuan
Phenikaa University
Email: tuan.doquoc@phenikaa-uni.edu.vn

Duong Thi Man
Institute of Physics, VAST
Email: duongthiman28@gmail.com

Duong Van Loi
Phenikaa University
Email: loi.duongvan@phenikaa-uni.edu.vn

Ha Thanh Hung
Hanoi Pedagogical University 2
Email: hthung80@gmail.com

Hồ Quốc Duy
Can Tho University of Engineering and Technology
Email: hqduy@ctuet.edu.vn

Hồ Sỹ Chương
Dong Nai University
Email: hosichuong@gmail.com

Ho Quoc Trung
Institute For Interdisciplinary Research in Science and Education (IFIRSE, ICISE)
Email: hoquoctrung98@gmail.com

Hoang Anh Tuan
Institute of Physics, VAST
Email: hatuan@iop.vast.ac.vn

Hoang Ngoc Long
Vien Vat ly
Email: hnlong@iop.vast.ac.vn

Hoàng Hải
Institute of Fundamental and Applied Sciences, Duy Tan University
Email: hhoang052@gmail.com

Hoàng Văn Ngọc
Viện Phát triển Ứng dụng, Trường Đại Học Thủ Dầu Một
Email: ngochv@tdmu.edu.vn

Huỳnh Quốc Trung

Đại học Tây Đô
Email: hqtrung@dtu.edu.vn

Huynh Anh Huy
Lecturer
Email: hahuy@ctu.edu.vn

Lai Thi Thu Hien
Hanoi University of Science
Email: laithithuhienhus@gmail.com

Lê Thị Hoá
Trường THPT Quang Trung
Email: lethihoa.phys@gmail.com

Lê Văn Cường
Institute For Interdisciplinary Research in Science and Education, ICISE
Email: lvcuong.98tv@gmail.com

Le Dai-Nam
Atomic Molecular and Optical Physics Research Group, Advanced Institute of Materials Science, Ton Duc Thang University
Email: ledainam@tdtu.edu.vn

Le Duc Ninh
ICISE, Quy Nhon
Email: leducninh@gmail.com

Le Hoang Phong
VNU - Key Laboratory
Email: lehoangphong_t59@hus.edu.vn

Le Tan Phuc
Duy Tan University
Email: letanphuc191190@gmail.com

Le Thi Cam Tu
Ton Duc Thang University
Email: lethicamtu@tdtu.edu.vn

Le Thi Hong Thanh
Quang Nam university
Email: lththanh@qnamuni.edu.vn

Le Thi Quynh Huong
University of Khanh Hoa
Email: lethiquynhhuong@ukh.edu.vn

Le Thu Lam
Tay Bac University
Email: lethulam@utb.edu.vn

Le Thuy Nhi
Khanh Hoa University
Email: lethuynhi@ukh.edu.vn

Le Tri Dat
Ton Duc Thang University
Email: letridat@tdtu.edu.vn

Le Van Hoang
Ho Chi Minh City University of Education
Email: hoanglv@hcmue.edu.vn

Ly Duy-Nhat
Ho Chi Minh City University of Education
Email: nhatld@hcmue.edu.vn

Mineo Hirobumi
Ton Duc Thang University
Email: h_mineo@hotmail.com

Ngô Hải Tân
Phenikaa University
Email: tan.ngohai@phenikaa-uni.edu.vn

Ngo Son Tung
Ton Duc Thang University
Email: sontungngo84@gmail.com

Nguyễn Phúc
The Institute of Fundamental Science and Application
Email: phucnguyen1989@gmail.com

Nguyễn Văn Chương
Le Quy Don Technical University
Email: chuong.vnguyen@lqdtu.edu.vn

Nguyễn Hồng Quang
Institute of Physics, VAST
Email: nhquang@iop.vast.ac.vn

Nguyễn Hồng Sơn
Trường Đại học Công đoàn
Email: atvsld@gmail.com

Nguyễn Như Đạt

Đại học Duy Tân
Email: nguyennhudat@duytan.edu.vn

Nguyễn Quang Báu
Trường ĐH Khoa Học Tự Nhiên
Email: nguyenquangbau@yahoo.com

Nguyễn Quang Hưng
Institute of Fundamental and Applied Sciences, Duy Tan Universityo
Email: nguyenquanghung5@duytan.edu.vn

Nguyễn Quyết Thắng
Faculty of Physics, VNU University of Science
Email: qthang52@gmail.com

Nguyễn Thị Lâm Quỳnh
VNU University of Science
Email: nguyenthilamquynh@hus.edu.vn

Nguyễn Thị Nguyệt Ánh
VNU University of Science
Email: vuongquyen0209@gmail.com

Nguyễn Văn Hoa
HCMUE
Email: hoanv@hcmue.edu.vn

Nguyễn Văn Mện
An Giang University - VNU HCM
Email: nvmen@agu.edu.vn

Nguyen Hong
Ha noi University of science and Technology
Email: hongnv2002@yahoo.com

Nguyen Oanh
UET
Email: oanhn54@gmail.com

Nguyen Tri Lan
Institute of physics, VAST
Email: nguyen.tri.lan@gmail.com

Nguyen Ba Phi
Mientrung University of Civil Engineering
Email: nguyenbaphi@muce.edu.vn

Nguyen Cong Ha
Nano and Energy Center, HUS, VNU/ Phenikaa Institute for Advanced Study
Email: congha141197@gmail.com

Nguyen Dang Nhuan
Oncology center, Thai Nguyen national hospital
Email: nguyendangnhuan1976@gmail.com

Nguyen Duy Huy
VNU University of Science
Email: huydn@hus.edu.vn

Nguyen Duy Khanh
Thu Dau Mot University
Email: khanhnd@tdmu.edu.vn

Nguyen Hai Chau
University of Siegen
Email: chaunguyen2808@gmail.com

Nguyen Hai Son
Ecole Centrale de Lyon
Email: hai-son.nguyen@ec-lyon.fr

Nguyen Hoang Giang
Đại học Bách khoa-ĐHQG Tp HCM
Email: nhgiang@hcmut.edu.vn

Nguyen Hoang Duy Thanh
Institute for Interdisciplinary Research in Science and Education
Email: nhdthanh@ifirse.icise.vn

NGUYEN Huu Ha
Dalat University
Email: hanh_sp@dlu.edu.vn

Nguyen Huynh Kim Ngan
Ho Chi Minh City University of Education
Email: ngannguyenqn79@hotmail.com

Nguyen Le Anh
Department of Physics, Ho Chi Minh City University of Education
Email: anhnl@hcmue.edu.vn

Nguyen Minh Hien
Graduate University of Sciences and Technology
Email: minhhien1706spvl@gmail.com

Nguyen Ngoc Anh
Dalat Nuclear Research Institute
Email: ngocanh8999@gmail.com

Nguyen Nhu Le
Physics Department, University of Education, Hue University
Email: nhulenhulele@gmail.com

Nguyen Thanh Tu
Ho Chi Minh City University of Education
Email: 4301102072@student.hcmup.edu.vn

Nguyen Thao Nhung
NTT Hi-Tech Institute, Nguyen Tat Thanh University
Email: nhungntt1996@gmail.com

Nguyen The Toan
VNU University of Science, Vietnam National University - Hanoi
Email: toannt@hus.edu.vn

Nguyen Thi Hien
Department of Physics, Tay Nguyen University
Email: nthien@ttn.edu.vn

Nguyen Thi Tham
Hanoi Pedagogical University No2
Email: nguyenthitham@hpu2.edu.vn

Nguyen Thi Bao Trang
Can Tho University
Email: baotrang231997@gmail.com

Nguyen Thi Hai Yen
Institute of Physics
Email: nhyen@iop.vast.ac.vn

Nguyen Thi Kim Thanh
Institute of Physics, Vietnam Academy of Science and Technology
Email: thanh.trieste@gmail.com

Nguyen Thi Thuy Nhung
Institute of Physics, VAST
Email: ntnhung@iop.vast.vn

Nguyen Thuy Trang
Faculty of Physics, VNU University of Science
Email: nguyenthuytrang@hus.edu.vn

Nguyen Toan Thang
Institute of Physics, Vast.
Email: ntthang@iop.vast.ac.vn

Nguyen Tu Niem
VNU University of Science
Email: nguyentuniem@gmail.com

Nguyen Tuan Duy
Institute of Physics
Email: ntdem@iop.vast.ac.vn

Nguyen Van Duy
Phenikaa University
Email: duy.nguyenvan@phenikaa-uni.edu.vn

Nguyen Van Hinh
Hanoi University of Industry
Email: nguyen.hinh@haui.edu.vn

Nguyen Viet Hung
Université catholique de Louvain
Email: viet-hung.nguyen@uclouvain.be

Nguyen Vo Anh Duy
Can Tho University
Email: stivenduy1912@gmail.com

Nguyen Duy Vy
Ton Duc Thang University
Email: nguyenduyvy@gmail.com

On Van Vo
Thu Dau Mot University
Email: onvv@tdmu.edu.vn

PHAM THI NGOC HAN
Faculty of Pharmacy, Ton Duc Thang University, Ho Chi Minh City, Vietnam
Email: ngochanpham274@gmail.com

Pham Duy Tan
Research Department, Tank Armour Command
Email: duytan1981@gmail.com

Pham Nguyen Thanh Vinh
Ho Chi Minh City University of Education

Email: vinhpnt@hcmue.edu.vn

Pham Thi Thanh Nga
Thuy loi University
Email: nga_ptt@tlu.edu.vn

Phan Hồng Khiêm
Institute of Fundamental and Applied Sciences, Duy Tan University, Ho Chi Minh City, Faculty of Natural Sciences, Duy Tan University, Da Nang City , Vietnam
Email: phanhongkhiem@duytan.edu.vn

Phan Thi Ngoc-Loan
Ho Chi Minh City University of Education
Email: loanptn@hcmue.edu.vn

Phan Thi Hong Hoa
Ho Chi Minh City University of Technology
Email: pthhoa.sdh19@hcmut.edu.vn

Phan To Quyen
IFIRSE, ICISE
Email: phantoquyen97@gmail.com

Phan Van Nham
Duy Tan University
Email: phanvannham@duytan.edu.vn

Phạm Dinh Khang
Military Institute of Mechanical Engineering
Email: dinhkhang307@gmail.com

Phạm Thế Song
Trường Đại học Tây Bắc
Email: phamthesong@utb.edu.vn

Phung T. V. Bac
VNU Vietnam Japan University
Email: ptv.bac@vju.ac.vn

Phung Van Dong
Phenikaa University
Email: dong.phungvan@phenikaa-uni.edu.vn

Tang Thi Dien
VNU University of science
Email: tangthidien_t61@hus.edu.vn

Thai Quynh Mai
Faculty of Pharmacy, Ton Duc Thang University
Email: quynhmai150399@gmail.com

Tran Chien Thang
HCMC University of Technology and Education
Email: thangtc@hcmute.edu.vn

Tran Ba Duong
VNU Key Laboratory
Email: tranbaduong_t63@hus.edu.vn

Tran Dinh Cuong
Phenikaa University
Email: cuong.trandinh@phenikaa-uni.edu.vn

Tran Dong Xuan
Institute of Fundamental and Applied Sciences (IFAS), Duytan University (DTU)
Email: trandongxuan@gmail.com

Tran Quang Dat
University of Transport and Communications
Email: quangdatsp08@gmail.com

Tran Quang Huy
Hanoi Pedagogical University 2
Email: tranquanghuysp2@gmail.com

Tran Quang Loc
DAMTP, University of Cambridge
Email: loctranq@gmail.com

Tran Thi Minh Thu
University of Science
Email: ttmthu@hcmus.edu.vn

Tran Thi Thanh Mai
Hanoi National University of Education
Email: thanhmaivatlyk7@gmail.com

Tran Viet Nhan Hao
University of Education, Hue University
Email: tvnhao@hueuni.edu.vn

Tran Vu Dong
Vietnam National University Ho Chi Minh City - University of Science
Email: vudongti@gmail.com

Trần Đình Thám
Trường ĐH Phạm Văn Đồng
Email: tdtham@pdu.edu.vn

Trần Công Duy
Graduate University of Sciences and Technology
Email: trancongduy.ukh1997@gmail.com

Trần Công Minh
Ho Chi Minh City University of Education
Email: congminh96k40@gmail.com

Trần Minh Tiến
Institute of Physics
Email: minhtien@iop.vast.ac.vn

Trần Ngọc Bích
Quang Binh University, University of Education, Hue University
Email: tranngocbichdhqb@gmail.com

Trần Thị Nhàn
Hanoi University of Industry
Email: trannhan09@gmail.com

Trần Thiện Lân
Hue University of Education, Hue University
Email: thienlan2303@gmail.com

Trần Trí Dũng
HCMUS
Email: trantridung2204@gmail.com

Trần Văn Ngọc
IFIRSE, ICISE
Email: tranngocapc06@gmail.com

Trịnh Thị Hồng
An Giang
Email: hong000914@gmail.com

Trịnh Thị Ngọc Gia
Can Tho University
Email: ttngia@ctu.edu.vn

Trieu Doan An
Ho Chi Minh City University of Education
Email: kehy.antrieu@gmail.com

Trinh Xuan Hoang
Institute of Physics, VAST
Email: hoang@iop.vast.ac.vn

Truong Dang Hoai Thu
Ho Chi Minh city University of Education
Email: thutdh@hcmue.edu.vn

Truong Minh Duc
Hue University of Education, Hue University
Email: tmduc2009@gmail.com

Truong Quan Hao
Ho Chi Minh city University of Education
Email: haotruongquan24@gmail.com

Vũ Hòa Bình
Institute of Physics
Email: vhbinh@iop.vast.ac.vn

Võ Hữu Cầu
Thanh Khe high school
Email: vohuucau.vl@gmail.com

Võ Văn Viên
Tay Nguyen University
Email: wvienk16@gmail.com

Vo Minh Truong
Mien Tay Construction University
Email: vminhtruong62@gmail.com

Vo Tien Dat
Truong Xuan High School
Email: litruongxuan@gmail.com

VTPS

IOP vast

Vietnam Academy of Science and Technology

United Nations Educational, Scientific and Cultural Organization

INTERNATIONAL CENTRE OF PHYSICS • TRUNG TÂM VẬT LÝ QUỐC TẾ •

apctp

asia pacific center for theoretical physics