Program & Abstracts

43rd National Conference on Theoretical Physics

HỘI NGHỊ VẬT LÝ LÝ THUYẾT TOÀN QUỐC LẦN THỨ 43

International Centre for Interdisciplinary Science and Education (ICISE)

Quy Nhơn

30 July - 2 August, 2018

Program & Abstracts

43rd National Conference on Theoretical Physics

International Center for Interdisciplinary Science and Education (ICISE)
Ghềnh Ráng, Quy Nhơn, Việt Nam

30 July - 2 August, 2018

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Welcome Message

It is a great pleasure to welcome you at the *43rd National Conference on Theoretical Physics* (NCTP-43) in Quy Nhon, Vietnam.

The NCTP-43 is organized by the Institute of Physics – Vietnam Academy of Science and Technology (IOP-VAST) under the support of the Vietnam Theoretical Physics Society (VTPS).

For over 40 years, the NCTP has been an annual activity of VTPS, and has become the most well-known annual scientific forum dedicated to the dissemination of the latest developments in the field of theoretical physics within the country.

Our mission is to foster scientific exchanges between theoretical and computational physicists in Vietnam and worldwide, and to promote a high-standard level of research and education in Vietnam.

Coming to this year conference are 116 participants from more than 30 research and educational institutions in Vietnam. Two invited talks, 24 oral talks and 69 poster contributions will be presented at the conference.

We wish you enjoy the scientific atmosphere at the conference and have a memorable stay in Quy Nhon.

The NCTP-43 Organizers

Committees

Organizer

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

Honorary Chair

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

Chair

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

Organizing Committee

- Trinh Xuan Hoang (Institute of Physics, VAST, Hanoi), Chair
- Le Van Hoang (Ho Chi Minh City Pedagogical University)
- Pham Tuan Minh (Institute of Physics, VAST, Hanoi)
- Dang Van Soa (Hanoi Metropolitan University)

Program Committee

- Hoang Anh Tuan (Institute of Physics, VAST, Hanoi), Chair
- Phung Van Dong (Institute of Physics, VAST)
- 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, Hanoi)

Sponsors

- International Centre of Physics (ICP), Institute of Physics, Vietnam Academy of Science and Technology
- Rencontres du Vietnam (RdV).

General Information

Conference Venue

International Centre for Interdisciplinary Science and Education (ICISE)
Ghềnh Ráng, Quy Nhơn, Vietnam.

Direction

The conference venue, the International Center for Interdisciplinary Science and Education (ICISE), is located about 7 km from the city center. The ICISE will provide free buses for participants going from the city center to the ICISE and for going back in the opposite direction (two bus trips per day). Please check the conference website for the detailed time table and the pick up place of the bus.

Instructions for Speakers

Speakers are requested to be present in their respective session room at least 10 minutes prior to the commencement of the session.

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.

Speakers should bring their own laptop ready for presentation. Laptop needs to be checked with the projector to be sure it is working before the session starts.

Instructions for Posters

Two poster sessions will be held during 08:30 AM - 10:00 AM in the mornings of 31 July and 1 August, respectively.

Poster should be prepared as one page of size A0 (841 mm x 1189 mm) in portrait (vertical) mode. Please hang your poster on the poster standee with a correct presentation code as given in the abstract book.

At least, the corresponding author of the poster should be present during poster session.

Instructions for Session Chairs

Please be aware of the time frame designated to each presenter, and warn the presenters as follows:

- Invited talk: first warning at 20 minutes, second warning at 25 minutes
- Regular talk: first warning at 15 minutes, second warning at 17 minutes.

Meeting Room

All sessions take place in the main conference room on the first floor of the ICISE.

Lunches

Lunches are provided for conference participants during 30 July - 1 August in the ICISE. Lunch coupons are included in your name badge holder.

Excursion

All participants are invited to the excursion on Tuesday afternoon, 31 July. The tour program consists of visiting Ngoc Hoa Monastery (Tịnh Xá Ngọc Hòa), Windy Strait (Eo Gió), Phuong Mai Sand Hill (Đồi Cát Phương Mai), and Trung Lương Tourist Park.

Time: 14:00 PM - 18:00 PM, Tuesday, 31 July 2018.
Pick-up place: International Centre for Interdisciplinary Science and Education (ICISE).
Drop-off place: Quy Nhon city center (Hai Au Hotel).

For your accompanied family members to join the tour, please buy tickets from the conference secretary on 30 July.

Gala Dinner

All participants are invited to Gala Dinner:

Time: 18:00 PM - 20:30 PM, Tuesday, 31 July 2018
Place: Sao Mai Restaurant, Hai Au Hotel, 489 An Dương Vương, Quy Nhon.

For your accompanied family members to attend Gala Dinner, please buy tickets from the conference secretary on 30 July.

VTPS Meeting

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

Time: 17:00 PM - 18:00 PM, Monday, 30 July 2018
Place: Main conference hall, 1st floor, International Centre for Interdisciplinary Science and Education (ICISE).

VTPS Young Research Award

On July 30, at the opening session of the conference will be an announcement and the delivery of the 2018 VTPS Young Research Awards to Dr. Trần Viết Nhân Hào (Hue University of Education).

Program Timetable

Time	Monday 30 July	Tuesday 31 July	Wednesday 1 August
08:30 – 10:00	Opening VTPS Young Research Award Nguyen Van Lien (I.1) *(Chair: Nguyen Toan Thang)*	Poster Session 1 *(Chair: Hoang Anh Tuan)*	Poster Session 2 *(Chair: Dang Van Soa)*
10:00 – 10:30	Coffee break	Coffee break	Coffee break
10:30 – 12:00	Tran Van Quang (O.1) Nguyen Tu Niem (O.2) Thai Thanh Lap (O.3) Nguyen Thi Kim Quyen (O.4) *(Chair: Bach Thanh Cong)*	Tran Viet Nhan Hao (I.2) Nguyen Thi Quynh Huong (O.12) Nguyen Quang Hung (O.13) *(Chair: Le Van Hoang)*	Dao Vong Duc (O.14) Nguyen Thi Hong Van (O.15) Do Quoc Tuan (O.16) Pham Van Ky (O.17) *(Chair: Hoang Ngoc Long)*
12:00 – 14:00	Lunch	Lunch	Lunch
14:00 – 15:30	Hirobumi Mineo (O.5) La Dung Kiet (O.6) Nguyen Ba Phi (O.7) Nguyen Duy Vy (O.8) *(Chair: Truong Minh Duc)*	Excursion	Le Duc Ninh (O.18) Tran Quang Loc (O.19) Le Duc Thien (O.20) Tran Van Ngoc (O.21) *(Chair: Phung Van Dong)*
15:30 – 16:00	Coffee break		Coffee break
16:00 – 17:30	Dinh Van An (O.9) Nguyen Duy Huy (O.10) Bui Phuong Thuy (O.11) *(Chair: Trinh Xuan Hoang)* VTPS Meeting		Dang Minh Triet (O.22) Le Thu Lam (O.23) Tran Dinh Cuong (O.24) *(Chair: Nguyen Quang Bau)*
from 18:00		Gala Dinner (18:00 - 20:30)	

Conference Program

Monday, 30 July 2018

08:00 - 08:30 Registration

Opening Session
Chair: Nguyen Toan Thang

08:30 - 08:45 Opening

08:45 - 09:00 VTPS's Young Research Award

09:00 - 10:00 I.1 – Invited
Quantum Materials: Particle Physics versus Condensed Matter Physics
Nguyen Van Lien (Institute for Bio-Medical Physics, Hochiminh City & Institute of Physics, VAST, Hanoi)
(Special invited talk in memory of Prof. Nguyen Ai Viet (1951-2017))

10:00 - 10:10 Photo Session

10:10 - 10:30 Coffee Break

Oral Session: *Condensed matter physics*
Chair: Bach Thanh Cong

10:30 - 10:50 O.1 – Oral
Oxygen substituted bismuth telluride: a new promising thermoelectric material
Tran Van Quang (Dept. of Physics, University of Transport and Communications, Hanoi, Vietnam)

10:50 - 11:10 O.2 – Oral
Dynamical susceptibility and excitations in ferroelectrics close to the paraelectric-ferroelectric phase transition
Nguyen Tu Niem (VNU Hanoi University of Science)

11:10 - 11:30 O.3 – Oral
Influence of the electric field on the optical properties of bilayer graphene nanoribbons
Thai Thanh Lap (College of Natural Sciences, Can Tho University)

11:30 - 11:50 O.4 – Oral

Dependence of hopping parameters in penta-graphene's structure by using Tight binding calculations method
Nguyen Thi Kim Quyen (Kien Giang University)

12:00 - 14:00 Lunch

Oral Session: *Molecular physics, quantum optics and quantum information*
Chair: Truong Minh Duc

14:00 - 14:20 O.5 – Oral
Quantum optimal control of coherent pi electron ring current in polycyclic aromatic hydrocarbons
Hirobumi Mineo (Ton Duc Thang University)

14:20 - 14:40 O.6 – Oral
Vibrational effects to unidirectional pi-electron rotation in an aromatic ring molecule with low-symmetry
La Dũng Kiệt (Đại học sư phạm TPHCM)

14:40 - 15:00 O.7 – Oral
Anomalous localization at the band center in 1D systems with an imaginary random potential
Nguyen Ba Phi (Mien Trung University of Civil Engineering)

15:00 - 15:20 O.8 – Oral
Role of squeezed light on the optomechanical hysteresis
Nguyen Duy Vy (Ton Duc Thang University)

15:30 - 16:00 Coffee Break

Oral Session: *Condensed matter and soft condensed matter physics*
Chair: Trinh Xuan Hoang

16:00 - 16:20 O.9 – Oral
Quantum Simulation Study on the adsorption of volatile organic compounds on 2D materials: Toward the Early Lung Cancer Detection
Dinh Van An (Vietnam Japan University)

16:20 - 16:40 O.10 – Oral
Electronic Structures and Metal-Insulator Transition in $LaNiO_3$ thin films
Nguyễn Duy Huy (VNU University of Science)

16:40 - 17:00 O.11 – Oral
Protein escape at the ribosomal exit tunnel: effects of native interactions, tunnel length and macromolecular crowding
Bui Phuong Thuy (Duy Tan University)

17:00 - 17:30 VTPS Meeting

Tuesday, 31 July 2018

Poster Session 1
Chair: Hoang Anh Tuan

08:30 - 10:00 P.1 – Poster
Molecular dynamics simulation of two-dimensional Al-Cu alloy
Nguyễn Hoàng Giang (Computational Physics Laboratory, Institute of Technology, Vietnam National University-Ho Chi Minh)

08:30 - 10:00 P.2 – Poster
Gauge Invariance with Spinor gauge field
Đào Vọng Đức (Institute of Physics, VAST)

08:30 - 10:00 P.3 – Poster
Effects of temperature and dopant concentration on oxygen vacancy diffusion coefficient of yttria-stabilized zirconia
Lê Thu Lam (Tay Bac University)

08:30 - 10:00 P.4 – Poster
Selective Kondo strong coupling in magnetic impurity flat-band lattices
Nguyen Duong Bo (Graduate University of Science and Technology, Vietnam Academy of Science and Technology, Hanoi 100000, Vietnam)

08:30 - 10:00 P.5 – Poster
The empirical formula for describing the ionization rate of the atomic system in the deep over-the-barrier regime
Pham Nguyen Thanh Vinh (Ho Chi Minh City University of Education)

08:30 - 10:00 P.6 – Poster
Adsorption of Toxic Gases on the Surface of Borophene: Quantum Simulation
Ta Thi Luong (Vietnam Japan University, VNU)

08:30 - 10:00 P.7 – Poster
Dynamical properties of the photon-added two-mode pair coherent state in the Jaynes-Cummings-model
Le Thi Hong Thanh (Center for Theoretical and Computational Physics, College of Education, Hue University)

08:30 - 10:00 P.8 – Poster
The role of electron-electron repulsion to the nonsequential double ionization mechanisms
Pham Nguyen Thanh Vinh (Ho Chi Minh City University of Education)

08:30 - 10:00 P.9 – Poster
Thermodynamic properties and excitation spectrum of Heisenberg spin chain with antiferromagnetic-ferromagnetic interactions
Pham Huong Thao (Faculty of Physics, University of Education, Hue University)

08:30 - 10:00 P.10 – Poster

Electronic and Thermal Transport in Penta-Graphene Nanoribbons

Vo Trung Phuc (Can Tho University)

08:30 - 10:00 P.11 – Poster

Conformational analysis of mouse NLRP3 domain structures by molecular dynamics simulation

Lai Thi Thu Hien (Hanoi University of Science)

08:30 - 10:00 P.12 – Poster

Twisted bundle model for DNA toroidal condensates

Phạm Văn Hoàng (Institute of Physics, VAST)

08:30 - 10:00 P.13 – Poster

Amorphous Silicon Carbide: a View from Molecular Dynamics Simulation

On Van Vo (University of Thu Dau Mot)

08:30 - 10:00 P.14 – Poster

Band engineering of Bi2Te3 under geometry optimization and strains

Tran Van Quang (Dept. of Physics, University of Transport and Communications, Hanoi, Vietnam)

08:30 - 10:00 P.15 – Poster

Phase diagram of excitonic condensation state in transition metal dichalcogenides

Do Thi Hong Hai (Graduate University of Science and Technology, Vietnam Academy of Science and Technology)

08:30 - 10:00 P.16 – Poster

Inflation Scenarios via Dilaton in Two-Time Physics

Vo Quoc Phong (VNUHCM-University of Science)

08:30 - 10:00 P.17 – Poster

Study of Influence of the anharmonic effect on changing size and shape of the metallic superlattice by an analytic statistical moment method.

Cao Huy Phuong (Hung Vuong University)

08:30 - 10:00 P.18 – Poster

Theoretical investigation of cyclotron-impurity resonance in monolayer graphene

Bùi Đình Hợi (Trường Đại học Sư phạm, Đại học Huế)

08:30 - 10:00 P.19 – Poster

Full $\mathcal{O}(\alpha)$ electroweak radiative corrections to $e + e^- \to ZH$ with beam polarizations at the ILC

Pham Nguyen Hoang Thinh (VNU-HCMC university of science)

08:30 - 10:00 P.20 – Poster

Observation of atomic and molecular orbital's property via transverse momentum distribution of ionized electron

Truong Truong Son (Ho Chi Minh City University of Education)

08:30 - 10:00 P.21 – Poster

Quantitative measures of entanglement in photon-added two-mode pair coherent states

Ho Sy Chuong (Dong Nai University)

08:30 - 10:00 P.22 – Poster

Dielectric constant of sodium chloride solution below terahertz frequency

Tran Thi Nhan (Hanoi University of Industry)

08:30 - 10:00 P.23 – Poster

Study on elastic deformation of interstitial alloys FeC and FeH with BCC structure at zero pressure

Nguyễn Đức Hiền (Mạc Đĩnh Chi high school, GiaLai)

08:30 - 10:00 P.24 – Poster

Joint remote generation of high-dimensional hybrid entanglement

Le Thanh Dat (Thang Long Institute of Mathematics and Applied Sciences, Thang Long University)

08:30 - 10:00 P.25 – Poster

Quasi plasmon polaritons and Higgs mechanism

Nguyễn Văn Hoa (Đại học Sư phạm Tp. Hồ Chí Minh)

08:30 - 10:00 P.26 – Poster

Structure and diffusion mechanism in sodium-silicate melt: a new approach

Nguyen Thi Thanh Ha (Hanoi University of Science and Technology)

08:30 - 10:00 P.27 – Poster

Optimum structure of 1D metal-dielectric multiple layered in transparent property.

Phung Duy Khuong (Institute of Physics)

08:30 - 10:00 P.28 – Poster

Characterization of FeNi3:C crystal as a magnetic material

Le Tuan (School of Engineering Physics, Hanoi University ò Science and Technology)

08:30 - 10:00 P.29 – Poster

The cosmological issues coming from a non-commutative B-L symmetry

Phung Van Dong (Institute of Physics, Vietnam Academy of Science and Technology)

08:30 - 10:00 P.30 – Poster

An entropic approach to determine the concentration ratio of players in market: An application to worldwide smartphone market

Chu Thuy Anh (Institute of Physics, VAST)

08:30 - 10:00 P.31 – Poster

Numerical determination of Einstein-Podolsky-Rosen steering for two-qubit states

Duong Thi Ha (Graduate University of Science and Technology, Vietnam Academy of Science and Technology; Thai Nguyen university of education)

08:30 - 10:00 P.32 – Poster

The trapping time of electron in an electrically induced circular graphene quantum dot

Nguyen Thi Thuy Nhung (Institute of Physics, Vietnam Academy of Science and Technology)

08:30 - 10:00 P.33 – Poster

Network structure and transport properties of Alumina and Aluminosilicate at amorphous and liquid states

Mai Thi Lan (Hanoi University of Science and Technology)

08:30 - 10:00 P.34 – Poster

Nonlinear optically detected electrophonon resonance full width at half maximum in a parabolic GaAs quantum well with different phonon models

Nguyen Dinh Hien (Nha Trang national ethnic minority Pre-university)

08:30 - 10:00 P.35 – Poster

One-loop Feynman integrals with complex internal-masses, general space-time dimension and higher-power ϵ-expansion

Phan Hong Khiem (VNUHCM-University of Science)

10:00 - 10:30 Coffee Break

Oral Session: *Particle, nuclear, and astro- physics*
Chair: Le Van Hoang

10:30 - 11:00 I.2 – Invited

Microscopic inputs for nuclear reactions studies at low-energy

Trần Viết Nhân Hào (Khoa Vật lý-Trường Đại học Sư Phạm Huế)

11:00 - 11:20 O.12 – Oral

Blocking effect of odd nucleon in odd nuclei at finite temperature

Le Thi Quynh Huong (University of Khanh Hoa)

11:20 - 11:40 O.13 – Oral

Bubble nuclei at zero and finite temperatures

Nguyen Quang Hung (Institute of Fundamental and Applied Sciences, Duy Tan University)

12:00 - 14:00 Lunch

14:00 - 18:00 Excursion

Wednesday, 1 August 2018

Poster Session 2
Chair: Dang Van Soa

08:30 - 10:00 P.36 – Poster
Optical properties of one dimensional metal-dielectric photonic crystals
Phung Duy Khuong (Institute of Physics)

08:30 - 10:00 P.37 – Poster
Molecular dynamics (MD) simulation of the phase-transitions in Tetra-Silicene
Nguyễn Hoàng Giang (Computational Physics Laboratory, Institute of Technology, Vietnam National University-Ho Chi Minh)

08:30 - 10:00 P.38 – Poster
Higgs phenomenology in renormalizable 3-3-1 model for Standard Model fermion masses and mixing
Hoàng Ngọc Long (Viện Vật Lý, VHLKHCNVN)

08:30 - 10:00 P.39 – Poster
Inverted neutrino mass hierarchy in the Standard Model with Q6 flavor symmetry
Võ Văn Viên (Tay Nguyen University)

08:30 - 10:00 P.40 – Poster
Analytical results for the different confined phonon models in parabolic quantum wells
Nguyen Dinh Hien (Nha Trang national ethnic minority Pre-university)

08:30 - 10:00 P.41 – Poster
Interplay between the spin-orbit coupling and magnetic field in the Lieb lattice
Nguyen Duong Bo (Graduate University of Science and Technology, Vietnam Academy of Science and Technology, Hanoi 100000, Vietnam)

08:30 - 10:00 P.42 – Poster
Structural transformation in Al2O3 under densification
Le Thi Chinh (Hanoi University of Science and Technology)

08:30 - 10:00 P.43 – Poster
A new model of Controlling resonance energy transfer in Gold nanoparticle emitters
Nguyễn Minh Hoa (Trường Đại học Y Dược Huế)

08:30 - 10:00 P.44 – Poster
Lepton Flavor Violation in the 3-3-3-1 model
Nguyen Tuan Duy (Center for Theoretical Physics,VAST)

08:30 - 10:00 P.45 – Poster
Entanglement and quantum teleportation via the plus-photon-added two-mode squeezed vacuum state

Trần Quang Đạt (University of Transport and Communications, Campus in Ho Chi Minh city)

08:30 - 10:00 P.46 – Poster

Molecular Kondo effect in flat-band lattices

Nguyen Thi Thuy (Institute of Physics)

08:30 - 10:00 P.47 – Poster

Tuning electronic transport properties of the V-shaped edge distorted zigzag graphene nanoribbons with substitutional doping

Nguyen Thanh Tien (College of Natural Science, Can Tho University)

08:30 - 10:00 P.48 – Poster

Molecular dynamics study of pressure effect on structure of CuNi alloy

Nguyen Thi Thao (Faculty of Physics, Hanoi National University of Education)

08:30 - 10:00 P.49 – Poster

Optically detected electrophonon resonance in a special asymmetric hyperbolic-type quantum well

Phạm Tuấn Vinh (Đại học Đồng Tháp)

08:30 - 10:00 P.50 – Poster

High-order expanded XAFS cumulants of DIA crystals on classical anharmonic correlated Einstein model

Tống Sỹ Tien (University of Fire Fighting & Prevention)

08:30 - 10:00 P.51 – Poster

An economical scheme for creation of a desired quDit state

Le Thanh Dat (Thang Long Institute of Mathematics and Applied Sciences, Thang Long University)

08:30 - 10:00 P.52 – Poster

Hydrogen storage in metal organic framework MIL-88D

Do Son (University of Technology, VNU-HCM)

08:30 - 10:00 P.53 – Poster

The effects of external electric fields on the energy gap and its properties of bilayer zigzag graphene nano-ribbons

Huynh Huyen Tran (College of Natural Sciences, Can Tho University)

08:30 - 10:00 P.54 – Poster

Unitary of neutrino mixing matrix

Nguyen Thi Kim Ha (Ho Chi Minh University of Science and IFIRSE)

08:30 - 10:00 P.55 – Poster

Electronic phase diagram for the half-filled Hubbard model with disorder

Hoang Anh - Tuan (Institute of Physics, VAST)

08:30 - 10:00 P.56 – Poster

Zero bias anomaly formation due to hopping mechanism in the two-site Anderson-Hubbard model

Bach Huong Giang (Faculty of Physics, VNU University of Science)

08:30 - 10:00 P.57 – Poster

Investigating the diffusion processes of Na ions in cathode material $Na_2Mn_3(SO_4)_4$ by using density functional theory

Tran Thien Lan (Nguyen Hue high school)

08:30 - 10:00 P.58 – Poster

Theoretical predictions of two-dimensional covalent organic frameworks (COF) with triangular topologies

Trinh Thi Phuong (Hong Duc University)

08:30 - 10:00 P.59 – Poster

The effect of a strong laser electric field on the absorption spectrum of excitons in GaAs/AlGaAs quantum wires

Dương Đình Phước (Trường Đại học Sư phạm, Đại học Huế)

08:30 - 10:00 P.60 – Poster

Algebraic method for atoms with two electrons

Ly Duy Nhat (Faculty of Physics - HCMC University of Pedagogy)

08:30 - 10:00 P.61 – Poster

Theoretical predictions of two-dimensional covalent organic frameworks (COF) with hexagonal topologies

Le Nam Duong (Hong Duc University)

08:30 - 10:00 P.62 – Poster

Magneto-thermoelectric effects in rectangular quantum wire with an infinitely high potential in the presence of electromagnetic wave (electron-acoustic phonon interaction)

Tran Hai Hung (Faculty of Physics, Hanoi University of Science, VNU)

08:30 - 10:00 P.63 – Poster

The influence of confined phonons on Ettingshausen effect in Quantum well with parabolic potential in the present of electromagnetic wave

Nguyen Quang Bau (Hanoi University of Science, Vietnam National University)

08:30 - 10:00 P.64 – Poster

Higgs decays h→Z gamma in the 3-3-1 model with beta=0

Trinh Thi Hong (An Giang University)

08:30 - 10:00 P.65 – Poster

Fermionized Heisenberg model on a non-Bravais lattice: Exact local constraint

Pham Thi Thanh Nga (Trường Đại học Thủy lợi)

08:30 - 10:00 P.66 – Poster

The development of cosmological perturbation in modified gravity of f(R) of

polynomial-exponential form
On Van Vo (University of Thu Dau Mot)

08:30 - 10:00 P.67 – Poster
A study of the optical Stark effect in InAs/GaAs quantum wells
Lê Thị Ngọc Bảo (Trường Đại học Sư phạm, Đại học Huế)

08:30 - 10:00 P.68 – Poster
Magneto-optical absorption and cyclotron-phonon resonance in monolayer molybdenum disulfide
Bùi Đình Hợi (Trường Đại học Sư phạm, Đại học Huế)

08:30 - 10:00 P.69 – Poster
Advanced design of VVER1000 fuel assembly with burnable absorber
Tran Hoai Nam (Duy Tan University)

08:30 - 10:00 P.70 – Poster
Progress in modeling of deuteron induced reactions within the modern nuclear interactions
Nguyen Hoang Tung (Institute of Fundamental and Applied Scicences)

10:00 - 10:30 Coffee Break

Oral Session: *Particle, nuclear, and astro- physics*
Chair: Hoang Ngoc Long

10:30 - 10:50 O.14 – Oral
Charge-Mass Sum Rules for Spinor fields in Extradimensions and the possibility for the existence of tachyon quarks and tachyon leptons
Đào Vọng Đức (Institute of Physics, VAST)

10:50 - 11:10 O.15 – Oral
T2K Experiment and latest results
Nguyen Thi Hong Van (Institute of Physics, Vietnam Academy of Science and Technology)

11:10 - 11:30 O.16 – Oral
On a new anisotropic inflation model
Do Q. Tuan (Vietnam National University, Hanoi)

11:30 - 11:50 O.17 – Oral
$f(R)$-theory of gravity: perturbative solutions, motions and gravitational waves in a central field
Pham Van Ky (Graduate university of science and technology, Vietnam academy of science and technology)

12:00 - 14:00 Lunch

Oral Session: *Particle, nuclear, and astro- physics*
Chair: Phung Van Dong

14:00 - 14:20 O.18 – Oral

Polarization observables in WZ production at the LHC in the Standard Model
Le Duc Ninh (Institute For Interdisciplinary Research in Science and Education)

14:20 - 14:40 O.19 – Oral
Constraining Wilson coefficients from lepton-flavour non-universal LEPI data
Tran Quang Loc (University of Science, Vietnam National University Ho Chi Minh City)

14:40 - 15:00 O.20 – Oral
Lepton flavor violation in the flipped 3-3-1 model
Lê Đức Thiện (Viện vật lý)

15:00 - 15:20 O.21 – Oral
Potential of discovering CP-violation in lepton sector with T2K-II and NOvA experiments
Tran Van Ngoc (IFIRSE - Quy Nhon)

15:30 - 16:00 Coffee Break

Oral Session: *Condensed matter and soft condensed matter physics*
Chair: Nguyen Quang Bau

16:00 - 16:20 O.22 – Oral
Experimental free energy measurement of sheared colloidal glasses
Dang Minh Triet (Cantho University)

16:20 - 16:40 O.23 – Oral
Investigation of oxygen vacancy migration in yttria doped cerium
Lê Thu Lam (Tay Bac University)

16:40 - 17:00 O.24 – Oral
Study on the melting of interstitial alloys FeH and FeC with BCC structure under pressure
Tran Dinh Cuong (Faculty of Physics, National University of Education, 136 Xuan Thuy, Cau Giay, Hanoi)

17:00 - 17:20 Closing

Conference Abstracts

I.1 – Invited, NCTP-43

Quantum Materials: Particle Physics versus Condensed Matter Physics

Nguyen Van Lien

Institute for Bio-Medical Physics, Hochiminh City and Institute of Physics, VAST, Hanoi

What are Quantum Materials? (new jobs for young physicists!). Elementary particles (in Particle Physics) versus Quasiparticles (in Condensed Matter). It all began with Superconductors (from conventional to topological). Quantum Hall States: a wide platform for new ideas. What does it take to make the graphene so attractive? From Spin Hall Effect to Topological Insulators. From Graphene to Dirac and Weyl semimetals in three dimensions. Could true Quantum Spin Liquids be experimentally realized? Making new quasiparticles in condensed matter. Closing: Why are there analogies between condensed matter and particle physics?

Presenter: Nguyen Van Lien

I.2 – Invited, NCTP-43

Microscopic inputs for nuclear reactions studies at low-energy

T. V. Nhan Hao (1,2), N. Nhu Le (1,2), N. Quang Hung (3), N. Hoang Tung (3,4)

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I will present our current studies and future plans concerning fission barriers, optical potentials, level densities and radiative strength functions within a microscopic framework based on non-relativistic self-consistent mean field (plus correlations) approaches using nucleon-nucleon interactions, mostly of the Skyrme type.

Presenter: Trần Viết Nhân Hào

O.1 – Oral, NCTP-43

Oxygen substituted bismuth telluride: a new promising thermoelectric material

Tran Van Quang

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We address an issue of the effect of oxygen substitution on the electronic structure and the thermoelectric property of bismuth telluride by employing first-principles calculation and the semi-classical Boltzmann transport theory. The newly formed compound, Bi2O2Te, is found to be a narrow band gap semiconductor with the band gap of Eg=0.13 eV. Significant enhancement of the Seebeck coefficient is found and originated from the presence of the flat band at the band edge which gives rise to the steep slope of density of states near Fermi energy. This is responsible for the enhancement of the power factor. Using the experiment-thermal conductivity of Bi2O2Te, we found that the figure of merit of ZT is about 0.06 at room temperature for n-type doping. Interestingly, it is significantly improved to be 0.33 with optimized carrier concentration. It is even more increased with the increase of temperature for both p and n type dopings. We suggest that Bi2O2Te is a promising thermoelectric materials with carrier concentration optimized for use in the moderate-temperature thermoelectric energy conversion.

Presenter: Tran Van Quang

O.2 – Oral, NCTP-43

Dynamical susceptibility and excitations in ferroelectrics close to the paraelectric-ferroelectric phase transition

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Static and dynamical susceptibilities, spectra of elementary excitations in ferroelectrics are calculated using the anisotropic exchange XZ Heisenberg model in the transverse field and the functional integral method . Behavior of the excitation close to the paraelectric-ferroelectric phase transition of ferrolectrics and relation with the soft mode & other models are also discussed.

Presenter: Nguyen Tu Niem

O.3 – Oral, NCTP-43

Influence of the electric field on the optical properties of bilayer graphene nanoribbons

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Recently, increasing attention has been paid to multilayer graphene, especially to bilayer graphene which consists of two coupled graphene sheets [1]. Interlayer interactions in bilayer graphene destroy symmetry and isotropy of energy bands and change linear bands (in monolayer graphene) into parabolic bands with the slight overlap between the highest occupied valence band and the lowest unoccupied conduction band. Recent experimental and theoretical studies show that the bandgap of bilayer graphene is widely tunable by external electric fields [2,3]. In this work, the optical properties of bilayer graphene nanoribbons under effects of external electric fields are investigated by using tight-binding model and the gradient approximation. The electric field can induce to the subband (anti)crossing, change the subband spacing, cause the oscillating bands, and increase the band-edge states as well. Our results demonstrate that the optical absorption

spectra exhibit rich prominent peaks structure mainly due to the subbands. In addition, the number, spectral intensity, and energy of the absorption peaks are strongly dependent on the interlayer atomic interactions and the ribbon width. The dependence of the optical excitations on both the magnitude and direction of the electric field is studied as well. These theoretical predictions could be validated by optical spectroscopy measurements. These results provide the possibilities for applying future optoelectronic applications base on bilayer graphene nanoribbons.

[1] Woo Jong Yu et al., Sci. Rep. 3, 1248 (2013). [2] Yuanbo Zhang et al., Nature 459 820–823 (2009). [3] Thanh-Tra Vu et al., Superlattice. Microstruct. 102 451-458 (2017).

Presenter: Thai Thanh Lap

O.4 – Oral, NCTP-43

Dependence of hopping parameters in penta-graphene's structure by using Tight binding calculations method

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In 2014, a new carbon allotrope discovered by Wang Qian and her coworker – is called penta-graphene. Similar to graphene, penta-graphene is a single lattice of carbon atoms, but atoms in this structure are more different than ones in graphene. To be specific, penta-graphene's structure adds more sp3- hybridized carbon atoms; it is important to destroy the symmetry at Fermi level and open the energy gap in band structure. This property is a convenient condition for applications in nanoelectronics. Consequently, penta-graphene has got great attention from researchers. In this paper, we use tight – binding calculations to investigate the energy band-dependent hopping elements. Besides comparing our model with previous Tight binding models, we also supplemented more interaction between next nearest neighbors to analyze the band structure through the effect of hopping parameters. Then choosing the apposite parameters to make the band more properly and clearly. Moreover, the necessary elements to present electronic energy are pointed out, such as overlap factor and onsite energy of carbon atoms. Thereafter, to more indicate the arrangement of the electrons, we continued to calculate the density of states by using Green's function formalism. Alternatively, based on graphene's experience, we propose an approach by using the vertical electric field to control the gap of penta-graphene as well as applying it for the electronic devices.

Presenter: Nguyen Thi Kim Quyen

O.5 – Oral, NCTP-43

Quantum optimal control of coherent pi electron ring current in polycyclic aromatic hydrocarbons

Hirobumi Mineo

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In this presentation we show results for quantum optimal control (QOC) of coherent pi-electron

ring current in polycyclic aromatic hydrocarbons (PAHs). There exist various patterns of coherent pi-electron ring currents since PAHs consist of many benzene rings. These include a localized ring current to a designated benzene ring, perimeter ring current which flows along the edges of PAHs. To demonstrate the QOC procedure of coherent pi-electron ring current in PAHs, we took naphthalene and anthracene as the simplest examples of linear PAHs. The ring current generation mechanisms were clarified by analyzing the temporal evolutions of the electronic excited states by UV or (UV+IR) laser pulses as well as those of electric fields of the optimal laser pulses. Time-dependent simulations of the perimeter ring current and middle ring current of anthracene, which are induced by analytical electric fields of UV pulsed lasers, were performed to reproduce the QOC results. The results suggest that these coherent ring currents can be generated by using analytical pulses without a sophistically designed QOC apparatus.

Presenter: Hirobumi Mineo

O.6 – Oral, NCTP-43

Vibrational effects to unidirectional pi-electron rotation in an aromatic ring molecule with low-symmetry

La Dũng Kiệt (1), Hirobumi Mineo (2)

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

Recently we proposed a new lasers-control scheme for unidirectional pi-electron rotation in an aromatic ring molecule with low-symmetry having no degenerate electronic states [1]. In this control scheme we assumed a fixed nuclei condition, and two relevant excited states subject to dynamical Stark shift using two linearly polarized UV lasers. Each laser is set to selectively interact with one of the two electronic states, the lower and higher excited states are shifted up and down with the same detuning, respectively, and two excited states become degenerate at their midpoint. In this presentation for more realistic numerical simulation of unidirectional pi-electron rotation, we take into account the nuclear vibrational effect in a molecular system. The total wave function is separated into electronic and nuclear parts under the B.O approximation. The vibrational states in each excited state follow the Franck-Condon principle. It is also interesting to investigate the interactions between the relevant two electronic states through the vibronic (non-adiabatic) couplings, and the vibronic couplings through the breakdown of the B.O approximation can be estimated at the equilibrium nuclear distance. We show a result of numerical simulation and discuss how the nuclear vibrations affect the unidirectional pi-electron rotation.

Reference [1] H. Mineo, M. Yamaki, G.S. Kim, Y. Teranishi, and Y. Fujimura, Phys. Chem. Chem. Phys. 18, 26786 (2016).

Presenter: La Dũng Kiệt

O.7 – Oral, NCTP-43

Anomalous localization at the band center in 1D systems with an imaginary random potential

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ment of Physics, Ajou University, Suwon 16499, Korea (*) Email: nguyenbaphi@muce.edu.vn

We study numerically the localization properties of eigenstates in a one-dimensional disordered lattice characterized by a non-Hermitian disordered Hamiltonian, where both the disorder and the non-Hermiticity are inserted simultaneously into the on-site potential. We calculate the averaged participation number, Shannon entropy, and structural entropy as a function of other parameters. We show that, in the presence of an imaginary random potential, all eigenstates are exponentially localized in the thermodynamic limit and strong anomalous Anderson localization occurs at the band center. In contrast to the usual localization anomalies where a weaker localization is observed, the localization of the eigenstates at the band center is strongly enhanced in the present non-Hermitian model. This phenomenon is associated with the occurrence of a large number of strongly-localized states with pure imaginary energy eigenvalues.

Keywords: Anderson localization, non-Hermitian Hamiltonian...

Reference: [1]. P. W. Anderson, Phys. Rev. 109, 1492 (1958). [2]. P. G. Silvestrov, Phys. Rev. B 64, 075114 (2001). [3]. A. Basiri, Y. Bromberg, A. Yamilov, H. Cao, and T. Kottos, Phys. Rev. A 90, 043815 (2014).

Presenter: Nguyen Ba Phi

O.8 – Oral, NCTP-43

Role of squeezed light on the optomechanical hysteresis

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The opto-mechanical oscillator is an object that could be driven and controlled by an optical field such as an intense laser beam. It is an essential element in various research fields such as measurements of gravitational waves and quantum information technologies. In this report, the dynamics of this oscillator will be presented using the semiclassical Hamiltonian formalism. The hysteresis behavior will be consider under the controlling of a squeezed light. The study could give fruitful information on the efficiency of using of squeezed light on the optomechanical laser cooling.

Presenter: Nguyen Duy Vy

O.9 – Oral, NCTP-43

Quantum Simulation Study on the adsorption of volatile organic compounds on 2D materials: Toward the Early Lung Cancer Detection

Dinh Van An (1,2)

(1) Vietnam Japan University (2) Osaka University

Screening tests to detect lung cancer at an early stage is very important for localizing the cancer cells and significantly improving the possibility of the curability of the disease. Breath contains clinically useful markers (violate organic compounds (VOCs)), which can be detected by electronic sensors. The monolayer materials such as MS2 (M=Mo,W, etc) and the two-dimensional (2D) materials such as graphene, silicone, germanene, etc. are strongly expected to

be promising materials for the electronic sensors in detecting the VOCs because these materials exhibit a very high sensitivity in adsorption of gases.

In this talk, I present simulation results of my group on the adsorption of various VOCs on the surfaces of the substrate MoS2 and 2D materials such as silicene, graphene, borophene, germanene by using the quantum simulation method based on Density Functional Theory (DFT). Scanning images of the adsorption possibility are shown for the six types of VOCs in breath of lung cancer patients on these materials by using Computational DFT-base Nanoscope (developed by author) to determine the potential adsorption areas and the diffusion path of VOCs on the substrate's surfaces. The adsorption energy is calculated by five functionals of van der Waals correction: revPBE, optPBE, optB88, optB86b and DFT-D2. Charge transfer between the substrates and VOCs is explored by calculating the Bader charge. In addition, the effect of electric field on the adsorption mechanism is also addressed.

Presenter: Dinh Van An

O.10 – Oral, NCTP-43

Electronic Structures and Metal-Insulator Transition in $LaNiO_3$ thin films

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Thin films and heterostructures based on transition-metal oxides are known to host a variety of fascinating phenomena such as superconductivity, ferroelectricity, and quantum magnetism. Recent observations of $LaNiO_3$ thin films on a $LaAlO_3$ or $SrTiO_3$ substrate have reported the abrupt changes in the electronic structures across the metal-insulator transition, as the film thickness is confined to a few unit cells. Various proposals have been made to clarify the onset of the insulating ground state but the precise mechanism is not yet fully understood. Furthermore, we find very limited theoretical works which explicitly take into account the effects of substrates and the film thickness. This paper reports a first-principles study on the electronic structures of $LaNiO_3$ thin films on a $SrTiO_3$ substrate as a function of the surface terminating layer and the film thickness.

The first-principles calculations are carried out within the framework of density-functional theory as implemented in STATE-Senri code. The electron-ion interaction is described using ultrasoft pseudopotential and the exchange-correlation interaction is treated within the generalized gradient approximation plus Hubbard U correction with $U_{eff} = 6$ eV.

Our results show that the electronic structure evolves from semimetallic to insulating, and finally to metallic state as the film thickness is increased. In detail, the NiO_2-terminated film with one unit cell thickness shows a pseudogap at the Fermi level owing to the negative charge transfer energy. On the other hand, the 1.5-unit-cell-thick LaO-terminated film exhibits an insulating gap of 1.0 eV as a result of the large exchange splitting energy. Such a large energy gap of 1.0 eV has not been obtained by other DFT calculations, and previous proposals such as octahedral breathing distortion only account for an energy gap of approximately 0.2 eV. For thicker films with either NiO_2 or LaO termination, the metallic state is quickly restored resembling that in bulk nickelate. In other words, the insulator to metal transition is observed as the film thickness is increased. As opposed to the compensation of polar interface in the $LaAlO_3$/ $SrTiO_3$ systems, we find no charge transfer across the $LaNiO_3$/ $SrTiO_3$ interface. Our results contribute to the understanding of the interplay between dimensionality and electron correlations towards the atomic-scale control of electronic phases in transition-metal oxides.

Presenter: Nguyễn Duy Huy

O.11 – Oral, NCTP-43

Protein escape at the ribosomal exit tunnel: effects of native interactions, tunnel length and macromolecular crowding

Phuong Thuy Bui (1) and Trinh Xuan Hoang (2,3)

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How fast a post-translational nascent protein escapes from the ribosomal exit tunnel is relevant to its folding and protection against aggregation. Here, by using Langevin molecular dynamics, we show that non-local native interactions help decreasing the escape time, and foldable proteins in general escape much faster than same length self-repulsive homopolymers at low temperatures. The escape process, on the other hand, is slowed down by the local interactions that stabilize the α-helices. The escape time is found to increase with both the tunnel length and the concentration of macromolecular crowders outside the tunnel. We show that a simple diffusion model described by the Smoluchowski equation with an effective linear potential can be used to map out the escape time distribution for various tunnel lengths and various crowder concentrations. The consistency between the simulation data and the diffusion model however is found only for the tunnel length smaller than a cross-over length of 90 Å to 110 Å, above which the escape time increases much faster with the tunnel length. It is suggested that the length of ribosomal exit tunnel has been selected by evolution to facilitate both the efficient folding and efficient escape of small single domain proteins. We show that macromolecular crowders lead to an increase of the escape time, and attractive crowders are unfavorable for the folding of nascent polypeptide.

Presenter: Bui Phuong Thuy

O.12 – Oral, NCTP-43

Blocking effect of odd nucleon in odd nuclei at finite temperature

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The present talk introduces our recent microscopic approaches, which were proposed to improve the treatment of blocking effect on the pairing properties of nuclear systems having odd number of nucleon (neutron or proton) at finite temperature [1]. The approaches are proposed based on the finite-temperature Bardeen-Cooper-Schrieffer (FTBCS) theory and the FTBCS theory incorporating the thermal fluctuations caused by the finiteness of the nuclear system. Based on the analysis of the exact solutions of the pairing problem, we found that the occupation number of the odd particle, which occupies the top level closet to the Fermi surface, should indeed decrease with increasing temperature. This finding completely invalidates the conventional assumption of the unity occupation number for the blocked level occupied by the odd particle.

References [1] N. Quang Hung, N. Dinh Dang, and L. T. Quynh Huong, Phys. Rev. C 94, 024341

(2016).

Presenter: Le Thi Quynh Huong

O.13 – Oral, NCTP-43

Bubble nuclei at zero and finite temperatures

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Nuclear bubble structure characterized by the depletion of the nucleon (proton/neutron) density at its center is studied within the Skyrme Hartree-Fock mean field consistently incorporating the pairing correlation, which is obtained by using the finite-temperature Bardeen-Cooper-Schrieffer theory and the exact pairing at finite temperature [1]. The numerical tests are performed for two spherical nuclei, ^{22}O and ^{34}Si, whose bubble structures, caused by a very low occupancy of the $2s_{1/2}$ single-particle level, were previously predicted at zero temperature. With the use of MSk3 nucleon-nucleon force, we are able to reproduce the experimentally measured occupancy of the $2s_{1/2}$ proton level as well as the binding energy, and consequently the most pronounced bubble structure in ^{34}Si. Moreover, our approach with exact pairing predicts a pairing effect which is stronger in ^{22}O and weaker in ^{34}Si as compared with other approaches, which use the approximate pairing. With increasing temperature, the bubble structure is found to be depleted and completely washed out when the temperature reaches a critical value, above which the factor measuring the depletion of the nucleon density vanishes.

References [1] L. Tan Phuc, N. Quang Hung, and N. Dinh Dang, Phys. Rev. C 97, 024331 (2018).

Presenter: Nguyen Quang Hung

O.14 – Oral, NCTP-43

Charge-Mass Sum Rules for Spinor fields in Extradimensions and the possibility for the existence of tachyon quarks and tachyon leptons

Đào Vọng Đức (1), Nguyễn Mộng Giao (2)

(1) Institute of Physics, Hanoi; (2) Center for Nuclear Techniques, Ho Chi Minh City

Within the framework of the mechanism proposed in our previous works (J. Mod. Phys. 5, 477, 2014; Int. J. Theor. Phys. 54, 1071, 2015; Int. J. Theor. Phys. 55, 959, 2016) for mass and charge creation we consider the charge-mass spectrum for unified spinor fields. It is shown that a single spinor field in space-time with extradimensions corresponds to a set of effective spinor fields in ordinary 4D space-time with charges and masses obeying the sum rules dictated from some specific assumptions on extradimensions. The obtained results give the support for the existence of some tachyon quarks and tachyon leptons.

Presenter: Đào Vọng Đức

O.15 – Oral, NCTP-43

T2K Experiment and latest results

Nguyen Thi Hong Van

Institute of Physics, Vietnam Academy of Science and Technology

A presentation on the T2K (Tokai-to-Kamiokande) experiment and the latest results is given. The T2K which started collecting data in 2010, is an accelerator-based long-baseline neutrino experiment placed in Japan. Its original goal is to discover the transition of muon neutrinos to electron neutrinos, which had been completed in 2013. Since then, T2K physic potential has been re-evaluated and searching for CP violation in the lepton sector is one of the central targets of the T2K. In summer 2017, with 2.25×10^{21} POT, T2K firstly reported that CP-conserving values of parameter δCP in the PMNS mixing matrix lie outside 2σ region. During the last run period from Oct. 2017 to May 2018, thanks to a stable operation at 490 kW beam power, statistic data set in anti-neutrino mode is doubled and sensitivity to CP violation is thus increased to an unprecedented level.

Presenter: Nguyen Thi Hong Van

O.16 – Oral, NCTP-43

On a new anisotropic inflation model

Tuan Q. Do

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We will present main results of our new model for anisotropic inflation. As a result, this model belongs to a conformal–violating Maxwell theory, in which a new coupling, $J^2(X)F_{\mu\nu}F^{\mu\nu}$, where J is a function of the kinetic term X of scalar field ϕ, is introduced. As a result, we are able to find out an anisotropic power-law solution to this model. More interestingly, stability analysis has been performed to indicate that the obtained solution is unstable during the inflation (a.k.a. rapid expansion) phase of the early-time universe but stable during the slow expansion phase of the late-time universe. This result implies that the cosmic no-hair conjecture seems to be violated during the slow expansion phase rather than the inflation phase in this proposed model.

Presenter: Do Q. Tuan

O.17 – Oral, NCTP-43

$f(R)$-theory of gravity: perturbative solutions, motions and gravitational waves in a central field

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Einstein's General theory of Relativity (GR) has been verified as an excellent theory of gravitation and, thus, it is a foundation of modern cosmological models. The GR is governed by the Einstein equation obtained from the Lagrangian $\mathcal{L}_G = R$. This equation can describe very well gravitational phenomena of the normal matter, however, it ineffectively explains other observations such as the accelerated expansion of the Universe (i.e., the problem of dark energy or cosmological constant), dark matter, cosmic inflation, quantum gravity, etc. These new observations require an extension or modification of the GR. One of the most popular extensions of the GR is the so called $f(R)$-theory of gravity, or just $f(R)$-gravity. This theory is based on

the Lagrangian $\mathcal{L}_G = f(R)$, where $f(R)$ is a scalar function of the scalar curvature R. This Lagrangian leads to an equation replacing the Einstein equation. To find an exact solution of this generalized equation is a hard, even impossible, task. It is why an approximate method of solving the equation is often chosen.

Here, after making a brief review on the $f(R)$-theory of gravity, we use a perturbative method to solve the $f(R)$-generalized Einstein equation in a central field which, being a good approximation in many cases, is either static or non-static. As a test of an $f(R)$-gravity, the obtained solutions are applied to investigating different astronomical and cosmological problems such as motions and gravitational waves in a central field. New phenomena are predicted.

References: Nguyen Anh Ky, Pham Van Ky and Nguyen Thi Hong Van, "Perturbative solutions of the f(R)-theory of gravity in a central gravitational field and some applications", Eur. Phys. J. C 78 (2018) no.7, 539. https://doi.org/10.1140/epjc/s10052-018-6023-6 (open access).

Presenter: Pham Van Ky

O.18 – Oral, NCTP-43

Polarization observables in WZ production at the LHC in the Standard Model

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WZ production is an important process at the LHC because it probes the non-Abelian structure of electroweak interactions and it is a background process for many new physics searches. In the quest for new physics, polarization observables of W and Z bosons can play an important role. They can be extracted from measurements and can be calculated using the Standard Model. In this talk, we discuss the effects of next-to-leading order electroweak and QCD corrections on those observables in the Standard Model.

Presenter: Le Duc Ninh

O.19 – Oral, NCTP-43

Constraining Wilson coefficients from lepton-flavour non-universal LEPI data

Tran Quang Loc (1,2), Le Duc Ninh (1)

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One popular method to find new-physics effects is to use the Standard Model Effective Field Theory framework, which has the same symmetry and fields as of the Standard Model, but with higher-dimension operators included in the Lagrangian. In this talk, we use the measurements of Z-pole data at LEP to constrain Wilson coefficients of dimension-six operators involving gauge bosons and fermions. We consider the general case of flavour non-universal leptons and present constraints on the Wilson coefficients.

Presenter: Tran Quang Loc

O.20 – Oral, NCTP-43

Lepton flavor violation in the flipped 3-3-1 model

Lê Đức Thiện, Đinh Nguyên Dinh, Phùng Văn Đồng, Đỗ Thị Hương, Nguyễn Thị Nhuần, Lê Xuân Thùy, Nguyễn Tuấn Duy

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In this work, we study a recently proposed 3-3-1 model, called flipped 3-3-1 model, in which the lepton generations transform nonuniversally under the gauge group, while the quark generations do not. This is in contrast with the ordinary 3-3-1 model, but it presents interesting lepton flavor violations such as $\mu \to 3e$ and $h \to \mu\tau$. The implication for neutrino masses is also discussed.

Presenter: Lê Đức Thiện

O.21 – Oral, NCTP-43

Potential of discovering CP-violation in lepton sector with T2K-II and NOvA experiments

Tran Van Ngoc (1), Cao Van Son (2), Nguyen Thi Hong Van (1,3)

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T2K and NOvA are two world leading long-baseline neutrino oscillation experiments working toward CP-violation. T2K with a proposed run extension up to 2026 (known as T2K-II) is expected to accumulate total 20×10^{21} protons-on-target and can be able to observe CP-violation at a level of 3 σ or higher if $\delta_{CP}\ -\pi/2$. In the meanwhile, NOvA experiment can enhance their capability to search for CP-violation with new development in electron (anti-) neutrino event classification. The sensitivity to CP-violation will dramatically increase to reach 4 σ or higher if T2K-II and NOvA are combined with ultimate constraint on θ_{13}. Our study also shows that improvement in systematics plays an important role in studying CP-violation.

Presenter: Tran Van Ngoc

O.22 – Oral, NCTP-43

Experimental free energy measurement of sheared colloidal glasses

Dang Minh Triet

School of Education, Cantho University

The free energy of hard-sphere systems allows a direct link between the particle-scale structure and macroscopic thermodynamic properties. Here we employ this framework to study the shear-induced structure of a colloidal glass, and link it to its macroscopic mechanical and thermodynamic state. We measure the nonequilibrium free energy under shear from the free volumes of the particles, and monitor its evolution with the applied strain. Unlike crystals, for which the elastic energy increases quadratically with strain due to affine particle displacements, for glasses the free energy decreases due to non-affine displacements and dissipation, reecting the ability of the glass to reach deeper free energy minima. We model this decrease using the nonaffine shear modulus and a standard viscous dissipative term. Our model and measurements allow us to disentangle the complex contributions of affine and nonaffine particle displacements in the transient shear deformation of glasses.

Presenter: Dang Minh Triet

O.23 – Oral, NCTP-43

Investigation of oxygen vacancy migration in yttria doped cerium

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Using the statistical moment method, the analytic expression of vacancy migration energy in yttria doped cerium (YDC) is derived within the fourth order moment approximation. This expression depends strongly on the interaction potentials between the diffusing oxygen ion and the surrounding cations. Our results show the predominant direction of oxygen vacancy migration and the influence of cation barriers on oxygen vacancy diffusion. The dependences of the migration energy on temperature and dopant concentration are evaluated in detail. Calculated results are compared with other theoretical results.

Presenter: Lê Thu Lam

O.24 – Oral, NCTP-43

Study on the melting of interstitial alloys FeH and FeC with BCC structure under pressure

Nguyen Quang Học (1), Nguyen Thi Hoa (2) and Tran Dinh Cuong (1)

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From the model of interstitial alloy AB with BCC structure and the condition of absolute stability for crystalline state we derive analytic expression for the temperature of absolute stability for crystalline state, the melting temperature and the equation of melting curve of this alloy by the way of applying the statistical moment method. The obtained results allow us to determine the melting temperature of alloy AB at zero pressure and under pressure. In limit cases, we obtain the melting theory of A main metal with BCC structure. The theoretical results are numerically applied for alloys FeH and FeC with using different potentials.

Presenter: Tran Dinh Cuong

P.1 – Poster, NCTP-43

Molecular dynamics simulation of two-dimensional Al-Cu alloy

Tram My Phuoc (1), Nguyen Hoang Giang (2), Vo Van Hoang (2)

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Formation of two-dimensional AlCu alloy from the liquid state is studied by molecular dynamics simulations. Model contains 10000 atoms (5000 Al atoms and 5000 Cu ones). Freezing temperature is found which has a reasonable value. Structure is studied via radial distribution functions, coordination number and interatomic distance distributions, ring statistics etc. We find that 2D-AlCu alloy has a triangle lattice structure the bond-length of which has a reasonable value compared to that of 3D counterpart. In addition, due to weak Al-Al and Cu-Cu interactions compared to Al-Cu one there is no phase separation in the alloy. Various defects are defined and discussed.

Acknowledgments: This research is funded by Vietnam National Foundation for Science and Technology Development (NAFOSTED) under grant number 103.01-2017.01

Presenter: Nguyễn Hoàng Giang

P.2 – Poster, NCTP-43

Gauge Invariance with Spinor gauge field

Đào Vọng Đức(1), Phù Chí Hòa (2)

(1) Institute of Physics, Hanoi; (2) Dalat University, Dalat

We present a formalism of gauge theory with gauge spinor field. As illustration examples the interaction Lagrangians are given for the cases of matter scalar and spinor fields. The traditional gauge vector fields can be constructed from the gauge spinor fields with appropriate gauge condition.

Presenter: Đào Vọng Đức

P.3 – Poster, NCTP-43

Effects of temperature and dopant concentration on oxygen vacancy diffusion coefficient of yttria-stabilized zirconia

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Oxygen vacancy diffusion coefficient in yttria-stabilized zirconia (YSZ) are investigated by statistical moment method. Vacancy-dopant association energy, vacancy migration energy are calculated as a function of temperature and dopant concentration. Oxygen vacancy diffusion coefficient increases with the increasing temperature but decreases with the dopant concentration. This degradation of the diffusion coefficient arise from the limitation for oxygen vacancy migration across cation barriers with the increasing dopant concentration. Calculated results are in good agreement with other theoretical and experimental results.

Presenter: Lê Thu Lam

P.4 – Poster, NCTP-43

Selective Kondo strong coupling in magnetic impurity flat-band lattices

Nguyễn Dương Bo (1), Trần Thị Thanh Mai (2), Nguyễn Thị Thủy (3), and Trần Minh Tiến (1,3)

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The periodic Anderson model in the Lieb lattice is studied by the slave-boson mean-field approximation in the strong interaction limit. The electron structure of conduction electrons on the Lieb lattice features both the band flatness and the Dirac linear dispersion at low energy. These features give rise to a competition between the soft-gap and the molecular Kondo effects in the lattice. We find a selective Kondo strong coupling, which occurs between the full local moment and the strong coupling regimes, and yields an effective lattice depletion due to the

correlation effect. In the selective Kondo strong coupling regime, the magnetic impurities at the selected sites are strongly coupled to conduction electrons, while at the remaining sites they are decoupled. At low temperature the selection of the Kondo strong coupling is always dominant at those lattice sites where the local density of states has the flat-band feature regardless of the impurity parameters. Rich phase diagrams for different model parameters are obtained.

Presenter: Nguyen Duong Bo

P.5 – Poster, NCTP-43

The empirical formula for describing the ionization rate of the atomic system in the deep over-the-barrier regime

Vinh N.T. Pham (1), Phuc Nguyen (2)

(1) Ho Chi Minh University of Education (2) Ho Chi Minh University of Science

Recently, an empirical formula used for describing the ionization rate of the atom in the over-the-barrier regime induced by static electric field has been proposed [Q. Zhang et al., Phys. Rev. A 90, 043410(2014)] and is valid only to $4.5F_b$ where F_b is the barrier-suppression strength. Meanwhile, the available laser intensity has far exceeded this limit. Therefore, this study proposes a new empirical formula describing the ionization rate of several atomic systems up to $10F_b$. Moreover, by providing the accurate numerical calculation of ionization rate and compare to the one proposed by Zhang et al., we figure out that their provided associating parameters in their are inappropriate and give the correction of these vital parameters based on their proposed formula.

Presenter: Pham Nguyen Thanh Vinh

P.6 – Poster, NCTP-43

Adsorption of Toxic Gases on the Surface of Borophene: Quantum Simulation

Ta Thi Luong (1,3), Pham Trong Lam (1), Dinh Van An (1,2)

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2D materials have attracted significant research interest due to their superlative characteristics. Borophene, a new member of 2D material family, was synthesized recently, expressing a unique structure and promising properties. In this study, the adsorption configuration, adsorption energies of toxic gas molecules (CO, NO, CO2, NH3, and NO2) on beta12-borophene was investigated by first-principle calculations using three approximations of van der Waals interaction: revPBE-vdW, optPBE-vdW, and DFT-D2. The most stable configurations and diffusion possibilities of the gas molecules on the beta12-borophene surface were determined visually by using Computational DFT-based Nanoscope. The nature of bonding and interaction between gas molecules and beta12 - borophene are also disclosed by using the density of states analysis. The obtained results are not only considerable for understanding gas molecules on borophene, but also useful for technological applications of borophene in very near future.

Presenter: Ta Thi Luong

P.7 – Poster, NCTP-43

Dynamical properties of the photon-added two-mode pair coherent state in the Jaynes-Cummings-model

Le Thi Hong Thanh (Center for Theoretical and Computational Physics, Quang Nam University), Truong Minh Duc, and Nguyen Ngoc Lam

Center for Theoretical and Computational Physics, College of Education, Hue University; Quang Nam University

In this paper, we study the properties of the photon-added two-mode pair coherent state in the Jaynes-Cummings-model. The dynamical behaviors of this state is found to be different compared to that of the corresponding coherent and pair coherent states. The density operator of the photon-added two-mode pair coherent state is presented using the dressed-state representation, in which the analytic expressions for the excitation probabilities and the photon distribution depending upon the time evolution are obtained. Also, the dynamical properties of the second order coherent and the interbeam coherent functions are considered in detail.

Presenter: Le Thi Hong Thanh

P.8 – Poster, NCTP-43

The role of electron-electron repulsion to the nonsequential double ionization mechanisms

Vinh N. T. Pham (1), Thu D. H. Truong (2)

(1) Ho Chi Minh University of Education (2) Ho Chi Minh University of Science

By using the classical three-dimensional ensemble model, we investigate the contribution of final state electron-electron repulsion to the mechanisms of nonsequential double ionization process of helium induced by an 800-nm laser pulse at $3.5 \times 10^{14} W/cm^2$ and $4.5 \times 10^{14} W/cm^2$. The double ionization mechanisms and their dynamics are comprehensively presented in this study. Then the role of electron-electron repulsion for each mechanism is deeply classified. The results indicate that the electron-electron repulsion is consistently vital in recollision-induced excitation with subsequential ionization and direct ionization mechanisms. While for exchanging-state mechanisms, its contribution gradually emerges as the laser intensity increases.

Presenter: Pham Nguyen Thanh Vinh

P.9 – Poster, NCTP-43

Thermodynamic properties and excitation spectrum of Heisenberg spin chain with antiferromagnetic-ferromagnetic interactions

Pham Huong Thao

Faculty of Physics, University of Education, Hue University

Thermodynamic properties of antiferromagnetic spin chain with various nearest-neighbor and next-nearest-neighbor exchange interactions are studied using functional integral method in J_1-J_2 Heisenberg model. Besides, the excitation spectrum of the system is also given. The results show that the system has two distinct excitations, one is gapless and the other is gapped from the ground state. The gapless branch which is related to combination of the two next nearest spins shows a quadratic dispersion relation in small k_z region. The gapped one is concerned combination of the two nearest spins. Changing the exchange parameters α and β influences on

the thermodynamic properties and the excitation spectra of the system.

Presenter: Pham Huong Thao

P.10 – Poster, NCTP-43

Electronic and Thermal Transport in Penta-Graphene Nanoribbons

Vo Trung Phuc (1), Vo Khuong Dien (1), Tran Yen Mi (1), Nguyen Thanh Tien (1)*

(1) Department of Physics, College of Natural Science, Can Tho University

A 2D penta-graphene sheet was cut along typical crystallographic in order to construct various penta-graphene nanoribbons (PGNRs). Their electronic and thermal transport properties are investigated through using the density functional theory in combination with the nonequilibrium Green's function method. Under various bias voltages, the electronic transport in the systems have been studied. The I-V characteristics have been extracted. DOS and T(E,Vbias) have been investigated for four Penta-Graphene nanoribbons (ZZ, ZA, AA and SS - Z: Zigzag, A: Armchair, S: Sawtooth). The calculated results show that the electronic transport properties of PGNRs are significantly different from the Graphene Nanoribbons (GNR). More interestingly, the study on the thermoelectric transport shows that the dimensionless figure of merit, ZT of the AA-PGNR is as high as 1.2 at room temperature. These results might be interesting in terms of both the fundamental science and the potential applications.

Presenter: Vo Trung Phuc

P.11 – Poster, NCTP-43

Conformational analysis of mouse NLRP3 domain structures by molecular dynamics simulation

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Gout is an extremely painful form of inflammatory arthritis caused by the formation of urate crystals (MSU) in the joints. While the MSU crystal is one of the triggers for 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 activation are necessary for Gout treatment. Using computational methods for comparative modeling and molecular dynamics simulations, the structure of NLRP3 protein with its domains, 3 potential structures are consistently constructed and tested. Next, the activator (Adenosine triphosphate - ATP) to NACHT and ASC with NLRP3 structures are docked and simulated. Ligands effect to action as well as limit of this protein is analyzed. This provide insights to understanding Gout disease development pathway via NLRP3 protein. Keywords: Molecular dynamic simulation, NLRP3 inflammasome, MSU, Gout treatment, ligand docking, ATP, ASC.

Presenter: Lai Thi Thu Hien

P.12 – Poster, NCTP-43

Twisted bundle model for DNA toroidal condensates

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We consider a model of DNA toroidal condensate that corresponds to a twisted bundle arrangement and compare it to other models of the chain conformation inside the condensate. The latter models correspond to those of a spool-like folding and a constant curvature bending. The ground states of the condensate in different models are obtained by minimizing a total energy given by the sum of the bending energy and a surface energy promoting compaction. It is shown that for the condensates of the same polymer length, the twisted bundle model leads to a lower ground state energy than both the spool model and the constant curvature model. A phase diagram of ground states depending on the chain length and the polymer stiffness is calculated for toroidal and rod-like condensates. We study also the curvature distribution and the thickness to radius ratio in optimal toroid condensates. Our study highlights the role of the twist geometry in DNA packing. The analytical results are supported by Monte Carlo simulations of a bead and spring model.

Presenter: Phạm Văn Hoàng

P.13 – Poster, NCTP-43

Amorphous Silicon Carbide: a View from Molecular Dynamics Simulation

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In this research, Models of amorphous silicon carbide (a-SiC) containing 8000 atoms Si and C at a ratio of 50:50 are obtained by cooling from the melt via molecular dynamics (MD) simulation. The evolution of various kinds of structural and thermodynamic behaviors in models upon cooling from the melt is found, including total energy, radial distribution function (RDF), interatomic distance, coordination number, and ring and bond-angle distributions. The glass transition temperature of 2D silicon carbide(Tg = 3017 K) has a reasonable value compared to that of its 3D counterpart. Calculations show that although most atoms in a-silicon carbide obtained at 300 K have a coordination Z =3 and mainly evolve into six-fold rings, a-silicon carbide also contains various structural defects including those not found in crystalline silicon carbide (c-SiC) such as adatoms, clusters of small-membered rings, large-membered rings and local linear defects. The concentration of defects in a-silicene is higher than that of the crystalline version. We find that buckling is not unique for all the atoms in the model. The strong distorted structure of a-silicon carbide compared to that of the crystalline version may lead to new physicochemical properties differed from those of c-SiC. Key Words: amorphous silicon carbide, SiC, 2D amorphous materials, liquid–glass transition

Presenter: On Van Vo

P.14 – Poster, NCTP-43

Band engineering of Bi2Te3 under geometry optimization and strains

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Bi2Te3 is a well-known state-of-the-art thermoelectric (TE) material operating at around room temperature. Effort to investigate new effects to improve its TE performance is of great interest. In this report, we employ first-principles density-functional-theory calculation to examine the band structure of Bi2Te3. Spin-orbital coupling also has to be take into account for the precise description. We found that the geometry optimization and atomic relaxation play an important role to determine the band structure, especially the band structure around Fermi energy. Moreover, the valence band edges significantly changes due to the effect of volume relaxation. The band topology is gradually distorted sensitively due to strain. Degenerate valleys at the band edges manifest a possible enhancement of the power factor by band engineering. This is also responsible for the change of TE transport coefficients due to pressure which is observed recently. We also show the calculation of the transport coefficients, i.e. the Seebeck coefficient, the electrical conductivity, and the power factor using the solution of semi-classical Boltzmann's equation in a constant relaxation-time approximation.

Presenter: Tran Van Quang

P.15 – Poster, NCTP-43

Phase diagram of excitonic condensation state in transition metal dichalcogenides

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The excitonic condensation state in transition metal dichalcogenides has been investigated by applying the unrestricted Hartree-Fock approximation to two-dimensional extended Falicov-Kimball model including electron-phonon interaction. Treating both the Coulomb attraction and the electron-phonon coupling in an equal footing, we have derived a set of self-consistent equations which allow us to determine both the excitonic condensate order parameter. Phase structures show us that both the Coulomb interaction and the electron-phonon coupling act together in establishing the excitonic condensed phase. At a given low temperature, the condensate phase is found in between two critical values of the Coulomb interaction. A critical temperature of the condensate phase transition increases as increasing the electron-phonon interaction. Depending on temperature and the Coulomb interaction, BCS-BEC crossover of the excitonic condensation state in the systems has been established.

Presenter: Do Thi Hong Hai

P.16 – Poster, NCTP-43

Inflation Scenarios via Dilaton in Two-Time Physics

Vo Quoc Phong (1), Le Minh Ngoc (1), Dam Quang Nam (1), Ngo Phuc Duc Loc (1)

(1) VNUHCM-University of Science

When The metric of Two-time Physics (2T model) can be reduced to the one-time metric

(Minkowski), Dilaton acts as Inflation with the slow-roll approximation. Moreover, the Higgs-Dilaton potential in this model can be consistent with chaos and hybrid inflation potential. This help for having a little information of extra dimension.

Presenter: Vo Quoc Phong

P.17 – Poster, NCTP-43

Study of Influence of the anharmonic effect on changing size and shape of the metallic superlattice by an analytic statistical moment method.

Cao Huy Phuong

Physics Unit, Faculty of Maths-Informatics, Hung Vuong University.

Vibrations of atoms or ions around the lattice points are inhamonic that cause the thermodynamic effects for the materials with the crystal structure. Using in the statistical physics, within the fourth order moment approximation, we have found out that the change of the length, volume and shape of the metallic superlattice are determined by the anharmonic effect. Increasing temperature leads to the more strong anharmonic lattice vibrations that cause changing size of the material.

Presenter: Cao Huy Phuong

P.18 – Poster, NCTP-43

Theoretical investigation of cyclotron-impurity resonance in monolayer graphene

Bui Dinh Hoi (1), Le Thi Thu Phuong (1), Tran Thi Ngoc Anh (1), Hoang Thi Duyen (1), Tran Cong Phong (2)

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In this work, utilizing perturbation theory we theoretically calculate the magneto-optical absorption coefficient in monolayer graphene, subjected to a perpendicular magnetic field and an intense electromagnetic wave. The electron-impurity interaction is taken into account at low temperatures. We found the cyclotron-impurity resonant effect in the absorption spectra. The half width at half maximum (HWHM) of cyclotron resonant peaks is obtained by computational method and shown as functions of the magnetic field and temperature. Our results are in good agreement with available experiments for specific parameters of the material.

Presenter: Bùi Đình Hợi

P.19 – Poster, NCTP-43

Full $\mathcal{O}(\alpha)$ electroweak radiative corrections to $e + e^- \to ZH$ with beam polarizations at the ILC

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We present full $\mathcal{O}(\alpha)$ electroweak radiative corrections to $e + e^- \to ZH$ with the initial beam polarizations at the International Linear Collider (ILC). The calculation is checked numerically by using three consistency tests that are ultraviolet finiteness, infrared finiteness, and

gauge parameter independence. In phenomenological results, we study the impact of the electroweak corrections to the total cross section as well as its distributions. In addition, we discuss the possibility of searching for an additional Higgs in arbitrary beyond the Standard Model (BSM) through ZH production at the ILC. Keywords: Higgs physics at future colliders, numerical method for particle physics, one-loop electroweak corrections, physics beyond the Standard Model.

Presenter: Pham Nguyen Hoang Thinh

P.20 – Poster, NCTP-43

Observation of atomic and molecular orbital's property via transverse momentum distribution of ionized electron

Son T. Truong (1), Trinh T. M. Tran (1), Thao N. Bui (1), Vinh N. T. Pham (1)

(1) Ho Chi Minh University of Education

As exposed to a uniform static electric field, the atom or molecule can be ionized, and the ionized electron is accelerated infinitely. However, the transverse momentum distribution of ionized electron on the plane perpendicular to the direction of the electric field becomes stable as it exceeds the parent ions. This transverse momentum distribution can be extracted from the asymptotic wavefunction solution to the static Schrodinger equation in the presence of electric field. In this study, we present an approach to numerically calculate this quantity in the two-dimensional plane and show that it can reflect the property as well as the symmetry of the orbitals from which the electron is ionized. The study is illustrated by the calculation of several atomic systems and excited states of molecular hydrogen ion.

Presenter: Truong Truong Son

P.21 – Poster, NCTP-43

Quantitative measures of entanglement in photon-added two-mode pair coherent states

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In this paper, we quantitate the entanglement degree in photon-added two-mode pair coherent states. The entanglement between the two modes are studied for such states. We investigate the inseparability of the photon-added two-mode pair coherent states by using the Peres-Horodecki inseparability criterion, the concurrence, the von Neumann and linear entropy criteria. The entanglement degree of these states are found to be different compared to that of the pair coherent states.

Presenter: Ho Sy Chuong

P.22 – Poster, NCTP-43

Dielectric constant of sodium chloride solution below terahertz frequency

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The dispersion of permittivity of the salt solution with different concentrations below the microwave frequency is represented via the modified relaxation Debye model in which the relaxations related to the rotation of free water molecules, ion-dipole polarization of hydrated ions, and translation of free ions are examined. This model is reasonable to describe the relaxation of the dielectric constant for the salt solution with low concentration at two Debye relaxation frequencies: the lower one relates to the ion-dipole relaxation and the higher one corresponds to the rotational relaxation of free water molecules. In addition, the increase in ion-dipole Debye frequency with the increase in the salt concentration is explained. The model also shows that the salt solution comprises about only 10.5% free ions which are responsible for the conductivity of the solution. To the salt solution with medium concentration, the complex permittivity is modeled as a sum of the Debye relaxation term of the free water molecules with the part contributed from free ions without the relaxation part related to hydrated ions. In this situation, free ions behavior as free electrons in crystal. For that reason, some parameters of free ions such as average speed, mean free path, mobility are estimated via the Drude's classical theory. This model could be useful to study similar electrolyte solutions.

Presenter: Tran Thi Nhan

P.23 – Poster, NCTP-43

Study on elastic deformation of interstitial alloys FeC and FeH with BCC structure at zero pressure

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The analytic expressions of the free energy, the mean nearest neighbor distance between two atoms, the elastic moduli such as the Young modulus E, the bulk modulus K, the rigidity modulus G and the elastic constants C11, C12, C44 for interstitial alloy AB with BCC structure under pressure are derived from the statistical moment method. The elastic deformations of main metal A is special case of elastic deformation for interstitial alloy AB. The theoretical results are applied to alloys FeC and FeH at zero pressure. The numerical results for this alloy are compared with the numerical results for main metal Fe and experiments.

Presenter: Nguyễn Đức Hiền

P.24 – Poster, NCTP-43

Joint remote generation of high-dimensional hybrid entanglement

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Entanglement, kind of nonlocal correlation at a distance, is a vital quantum resource without which many useful tasks cannot be performed. In general, generation of entanglement is tricky. Usually, the to-be-entangled parties should be brought together at one place to implement necessary entangling operation before distributing them to remote locations. However, thanks to the so-called entanglement swapping property, parties that have never met can also be made entangled with each other. Here we exploit such property to generate a type of entanglement between a quDit and a spatially separated quNit. Moreover, to enhance the security, the generation scheme requires two remote generators whose role is designed in such a way that either of them alone cannot succeed but both of them working in close cooperation can. Concretely, we propose two schemes for such joint remote generation of the hybrid entanglement by means of four high-dimensional Einstein-Podolsky-Rosen pairs. In one scheme the to-be-entangled parties have to participate actively in the process of entanglement generation, while in the other scheme their participation is just passive. Each scheme suits a specific technological condition and both succeed with unit probability.

Presenter: Le Thanh Dat

P.25 – Poster, NCTP-43

Quasi plasmon polaritons and Higgs mechanism

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Following the Anderson's idea, considering the massive exchange boson of electromagnetic fundamental force in media is the upper branch of quasi-plasmon-polariton, using analogies between condensed matter and particle theory, also concept of emergence, the mass problem of particles and quasi-particles in the frame work of Higgs mechanism was investigated. The mass transfer rates of exchange bosons from Higgs particle of electromagnetic, strong and weak fundamental forces were expressed in explicit forms. Some behavior of Higgs particles and vacuums are predicted.

Presenter: Nguyễn Văn Hoa

P.26 – Poster, NCTP-43

Structure and diffusion mechanism in sodium-silicate melt: a new approach

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In this work, the structural properties and dynamics in sodium-silicate melt (Na2O.4SiO4) are investigated by molecular dynamics simulation. Structural characteristics are clarified through the pair radial distribution function (PRDF), distribution of SiOx coordination units as well as Qn (Qn is SiOx units with n BO), etc. The transport properties are investigated via simplex. Dynamical investigation reveals that Si and O diffuse by bond break-reformation mechanism, while the motion of Na consists of two parallel processes. Specially, we propose a new link-cluster function Flk(r, t) to clarify dynamics heterogeneity (DH) phenomena. The result shows that during a simulation time the Si-O network has a two-domain structure consisting of immobile

and mobile domains. These type domains are significantly different in local microstructure, mobility of atoms and chemical composition.

Presenter: Nguyen Thi Thanh Ha

P.27 – Poster, NCTP-43

Optimum structure of 1D metal-dielectric multiple layered in transparent property.

Phung Duy Khuong, Tran Minh Tien

Institute of Physics

We investigate the optical properties of 1D metal-dielectric multiple layers made by silver Ag/TiO2 using invariant imbedding method developed by us recently. We study optical properties in both periodic and quasi-periodic generated by Thue-Morse or Fibonacci sequences. In some specific cases, at the edge of band structure the maximum of transmittance achieves about 90% when total thickness of all metal layers is about 70nm, while the maximum of transmittance of bulk silver layer is about 5% at large frequency corresponding to small wavelength (320nm). We study also the total thickness of metal increasing about 10% (80nm), but the maximum of transmittance decreases about 5% (85%).

Presenter: Phung Duy Khuong

P.28 – Poster, NCTP-43

Characterization of FeNi3:C crystal as a magnetic material

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The ab initio calculations of the electronic structure of FeNi3 at extreme pressures are performed with ABINIT package based on density-functional theory. The C substitution in Ni site is investigated in the light of the influence on thermodynamic stability, elastic properties and especially, on the magnetic properties of cubic FeNi3.

Presenter: Le Tuan

P.29 – Poster, NCTP-43

The cosmological issues coming from a non-commutative B-L symmetry

P. V. Dong (1), D. T. Huong (1), T. D. Tham (2), N. T. Thuy (3), D. V. Soa (4)

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We propose a unified setup for the cosmological issues such as inflation and reheating, dark matter, and baryon-number asymmetry through the neutrino mass seesaw mechanism. Our scenario emerges naturally from a gauge group that contains B-L as a non-commutative symmetry, broken by a scalar that drives inflation. Its decays to right-handed neutrinos or Higgs fields reheat the universe. Automatic matter parity conservation stabilizes asymmetric dark matter candidates directly linked to the matter-antimater asymmetry of the universe.

Presenter: Phung Van Dong

P.30 – Poster, NCTP-43

An entropic approach to determine the concentration ratio of players in market: An application to worldwide smartphone market

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Since 1982, the Herfindahl – Hirschman Index (also known as Herfindahl–Index, HHI, or sometimes HHI – score) has been used by the U.S. Department of Justice and the Federal Trade Commission to determine market concentration for purposes of antitrust enforcement. According to economists and lawyers working in the field of market analysis and antitrust, the Herfindahl – Hirschman Index allows to identify the size of firms in relation to the industry and an indicator of the amount of competition among them. Essentially, the Herfindahl – Hirschman Index is equivalent to the Simpson Diversity Index, which is a diversity index used in ecology; the inverse participation ratio (IPR) in physics; the effective number of parties index in politics; and even the Inventive concentration of fuel cell patents. In this work, the Herfindahl – Hirschman Index is reformulated in the term of entropic concept that supports a statistically mechanical consideration for several criteria used in economics and judicial proceedings of antitrust. Furthermore, within provided framework many physically equivalent quantities of a given market are developed and analyzed.

Presenter: Chu Thuy Anh

P.31 – Poster, NCTP-43

Numerical determination of Einstein-Podolsky-Rosen steering for two-qubit states

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Einstein-Podolsky-Rosen (EPR) steering, together with Bell nonlocality and entanglement (nonseparability), are basic notions of quantum nonlocality. In a typical EPR steering experiment, Alice and Bob share a bipartite quantum system which can be at an arbitrary distance apart. Alice, by performing a measurement on her side, steers Bob's system into the corresponding conditional ensemble, thus can predict the outcome of Bob's measurements prior to his performance. Bob, however, is not convinced that Alice can do so if he can explain Alice's prediction with a local model [more precisely, local hidden state model (LHS)] for his side. In this case, the state is said to be unsteerable. It is well established that steerability forms a distinct class of quantum nonlocality which is a subset of the entanglement class and a superset of the Bell nonlocal one.

Despite of intense research since the work of EPR in 1935 until recent years, the question of whether a given quantum state can be used to demonstrate the EPR steering remains open, even for the simplest case of two qubits. Recently, a geometrical approach [Nguyen et al., Phys. Rev. A 94, 012114 (2016)], where steerability of a quantum state with respect to a given LHS

model is characterized by the so-called principal radius of the capacity of the LHS model, has been developed. In this approach, a state is steerable if and only if the principal radii of all possible LHS models are less than 1. Thus, the steerability problem is transformed into the determination the optimal LHS model that has the largest principal radius.

In this work, we report our numerical implementation for the calculation of the principal radius of a two-qubit state with a given LHS model. We benchmark our implementation for the cases of the Werner state and T-states where analytic solutions are available. Our work is the first step towards the determination of the optimal LHS model.

Presenter: Duong Thi Ha

P.32 – Poster, NCTP-43

The trapping time of electron in an electrically induced circular graphene quantum dot

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In graphene, electrons can only be trapped in a finite time due to the effect of the Klein tunneling. We study the trapping time of electron in a circular graphene quantum dot induced by an external Gaussian potential. The trapping times are calculated through a numerical determination of the quasi-bound states of electron in the quantum dot by solving the two-dimensional Dirac-Weyl equation. We show that the trapping time increases with the angular momentum m of electron. The trapping time depends on the dot radius differently for different m. In particular, the trapping time increases with the dot radius for $m < 3$ but decreases with the dot radius for $m > 3$. On the other hand, the trapping time always decreases with the potential height for every m. The calculated wave functions of the quasi-bound states show that an electron having longer trapping time is also better localized in space. Our results also indicate that there is a tradeoff between the capabilities of a graphene quantum dot to trap more electrons in the dot and to trap them more efficiently in time.

Presenter: Nguyen Thi Thuy Nhung

P.33 – Poster, NCTP-43

Network structure and transport properties of Alumina and Aluminosilicate at amorphous and liquid states

M.T.Lan, N.V.Hong, N.T.Thanh Ha and L.V.Vinh

Hanoi University of Sciences and Technology

Network structure and transport properties of Al2O3 and Al2O3.2SiO2 at amorphous and liquid states is conducted by Molecular Dynamics Simulation (MDS). The structural characteristics and self-diffusion coefficient of atoms in the systems are investigated to clarify the relation between structure and diffusion. Specially, the origin of the first peak splitting of Al-Al pair radial distribution function is explained in detail in this work.

Presenter: Mai Thi Lan

P.34 – Poster, NCTP-43

Nonlinear optically detected electrophonon resonance full width at half max-

imum in a parabolic GaAs quantum well with different phonon models

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The influence of different phonon models on the nonlinear optically detected electrophonon resonance (NLODEPR) effect and NLODEPR full-width at half-maximum (FWHM) via both one and two photon absorption processes in a parabolic GaAs quantum well by using the operator projection is theoretically studied. The obtained numerical result for the parabolic GaAs/AlAs quantum well shows that the NLODEPR full-width at half-maximum depend on the confinement frequency and temperature. Besides, in the two cases of confined and bulk phonons, the FWHM increases with the increase of temperature and confinement frequency. Furthermore, in the large range of the confinement frequency, the influence of phonon confinement plays an important role and cannot be neglected in considering the NLODEPR full-width at half-maximum.

Presenter: Nguyen Dinh Hien

P.35 – Poster, NCTP-43

One-loop Feynman integrals with complex internal-masses, general space-time dimension and higher-power ϵ-expansion

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In this talk, we study systematically scalar one-loop two-, three-, and four-point Feynman integrals with the following aspects: (i) The first aspect is to regularize Landau singularities and solve Inverse Gram determinant appear in computing one-loop corrections to processes of interest at future colliders. We consider the calculation for one-loop integrals with complex internal masses in order to regularize Landau singularity. Furthermore, unlike the traditional approach proposed by G. 't Hooft and M. Veltman, the method used in our work can also extend to evaluate directly tensor one-loop integrals. Thus, this may open a new approach to solve the Inverse Gram determinant problem analytically. (ii) The second aspect is to obtain higher-power ϵ-expansion terms for one-loop integrals. This plays a important role as building blocks in general higher-loop or multi-leg processes. We develop a new method for evaluating one-loop integrals. The results are presented in terms of generalized hypergeometric series such as Gauss, Appell F_1 functions, etc.

We also perform the numerical checks for the analytical expressions in this work by comparing with LoopTools and AMBRE/MB. We find that the numerical results from this work are in good agreement with LoopTools at ϵ^0-terms and AMBRE/MB at higher-order of ϵ-expansions, at higher d-dimension.

Additionally, this work is applied for evaluating scalar one-loop Feynman integrals developed leading Landau singularities which may appear in real scattering processes at future colliders.

Presenter: Phan Hong Khiem

P.36 – Poster, NCTP-43

Optical properties of one dimensional metal-dielectric photonic crystals

Phung Duy Khuong, Tran Minh Tien

Institute of Physics

Using invariant imbedding method developed recently, we study the optical properties of 1D metal-dielectric photonic crystals (1D-MDPC) made by silver (Ag) and titanium dioxide (TiO_2) alternatively. We find that at some range of frequencies a large transmittance through 1D-MDPC it achieves about 85%, we also find that the transmittance increases when the number of periodic increase while total thickness of metal is around 70nm. Finally we study the transmittance depending on polarization and incident angle of electromagnetic wave.

Presenter: Phung Duy Khuong

P.37 – Poster, NCTP-43

Molecular dynamics (MD) simulation of the phase-transitions in Tetra-Silicene

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University – HoChiMinh City

Tetra-silicene is an allotrope of hexa-silicene and has recently been studied. It promises many applications in the microelectronics industry. However, studies on phase-transition processes of this material are not available. Thus, by using molecular dynamics (MD) simulation, we study the phase-transition processes of 2D tetra-silicene from the liquid state to the solid one and vice versa. The model contains 10000 atoms and has a fixed length in the z direction which equals to the buckling length of 1.49Å with the elastic reflection behavior boundary. Stillinger-Weber interaction potential is used. We find that the crystallization temperature of tetra-silicene is 1880K which is higher than that of hexa-silicene (1775K). Besides, Radial distribution functions, coordination numbers, ring statistics, interatomic distances, bond-angle distributions are investigated in details. Acknowledgments This research is funded by Vietnam National Foundation for Science and Technology Development (NAFOSTED) under grant number 103.01-2017.01

Presenter: Nguyễn Hoàng Giang

P.38 – Poster, NCTP-43

Higgs phenomenology in renormalizable 3-3-1 model for Standard Model fermion masses and mixing

N. V. Hop, H. N. Long, N. H. Thao

Hanoi Pedagogical University No 2 and IOP

The Higgs sector of the renormalizable 3-3-1 model model for Standard Model fermion masses and mixing is presented. Phenomenology concerned the SM-like Higgs boson is considered in details.

Presenter: Hoàng Ngọc Long

P.39 – Poster, NCTP-43

Inverted neutrino mass hierarchy in the Standard Model with Q6 flavor symmetry

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We construct a Standard model extension with Q6 flavor symmetry in the framework of sewsaw mechanism in which the inverted neutrino mass spectrum is naturally explained without using perturbation theory.

Presenter: Võ Văn Viên

P.40 – Poster, NCTP-43

Analytical results for the different confined phonon models in parabolic quantum wells

Nguyen Dinh Hien (1), Le Dinh (2), Tran Cong Phong (3)

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We present analytical results for the matrix element for electron-confined phonon interaction in the extreme quantum limits with different confined phonon models in parabolic quantum wells described by the Fuchs-Kliewer slab, Ridley's guided, and Huang-Zhu models. The obtained analytical results for the parabolic quantum wells show that when phonons are confined the only even modes in the Huang-Zhu model, odd modes in the Fuchs-Kliewer slab model and even modes in the Ridley's guided model contribute to intra-subband transitions. But, for inter-subband transitions, the only odd modes in the Huang-Zhu model, even modes in the Fuchs-Kliewer slab model and odd modes in the Ridley's guided model make contribution. These results are consistent with previous works for the different confined phonon models in square quantum wells.

Presenter: Nguyen Dinh Hien

P.41 – Poster, NCTP-43

Interplay between the spin-orbit coupling and magnetic field in the Lieb lattice

Ta Van Binh (1), Nguyen Duong Bo (1) and Tran Minh Tien (1,2)

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The interplay between the spin-orbit coupling and an external magnetic field in the Lieb lattice is studied. The electron structure of the tight-binding model on the Lieb lattice features both the flat and the Dirac linearly dispersing bands. The spin-orbit coupling can generates a topological insulating state, while the magnetic field often breaks the topology. As a result of the interplay, a selective spin component insulating occurs. The topology is detected by both the edge modes and the Chern number.

Presenter: Nguyen Duong Bo

P.42 – Poster, NCTP-43

Structural transformation in Al2O3 under densification

Le Thi Chinh, Le Van Vinh*

School of Engineering Physics, Hanoi University of Science and Technology, Hanoi, Vietnam.

Molecular dynamics simulations of Al2O3 system have been used to investigate the pressure-induced structural transformation. The sample of Al2O3 containing 5000 atoms was heated at 5000 K for 100 ps and then cooled down to 3500 K for 100 ps. This sample was continuously cooled down to 300 K with the cooling rate of 1x1013 K/s upon the pressure of 0, 5, 10, 15, 20, 30, 45 and 60 GPa. With increasing pressure above 5 GPa, O atoms are more ordered than Al atoms. By using common neighbour analysis method, we found that, firstly, O atoms form to hcp clusters. With further increasing pressure, O atoms form both fcc and hcp crystals. The formation of crystalline O lattices leads to Al atoms which become more structural order. The structural transformation has been discussed and visualized in details.

Presenter: Le Thi Chinh

P.43 – Poster, NCTP-43

A new model of Controlling resonance energy transfer in Gold nanoparticle emitters

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Currently, the mechanisms of Fluorescence Resonance Energy Transfer (FRET) with metallic nanoparticles are still in disagreement with experiments and calculations. We found that: (1) the Förster Resonance Energy Transfer (FRET) process observed the experimental Förster critical transfer distance R0 and energy ratio to be 1–10 nm and respectively, in which R is the distance between Donor (D) and acceptor (A) dye molecules; (2) the Surface Resonance Energy Transfer (SET) process observed the experimental transfer distance R0 and energy ratio to be 10–100 nm and respectively, where R is distance between D and A where A are gold nanoparticles; (3) the electronic excitation transfer process present while D and A are very far apart with energy ratio is like far field interaction – Coulomb Energy Transfer (CET). A recent work proposed a model with "nanowave emitter station and antenna" that is unified of all three FRET, SET, and CET mechanisms. However, some recent experiments have found an abnormality when observing FRET. In this paper we propose a reverse mechanism and confirm the role of its coulomb interaction, thereby confirming the role of gold nanoparticles as being able to capture fluorescence of concentrations of golden nanoparticles. The paper presents the simple model unifying all 3 FRET, SET, and CET mechanisms, with 6 parameters and 2 overlapping functions. This model agrees quite well with some experimental results.

Presenter: Nguyễn Minh Hoa

P.44 – Poster, NCTP-43

Lepton Flavor Violation in the 3-3-3-1 model

D.N.Dinh (1), N.T.Duy (1) , P.V.Dong (1), D.T.Huong (1), N.T.Nhuan (2), L.D.Thien (2), L.X.Thuy (2)

(1) Center for Theoretical Physics, Institute of Physics, VAST; (2) Graduate School of Science, VAST

The discovery of neutrino oscillations not only indicates that neutrinos are massive, but also shows the clear evidence of lepton flavor violation (LFV) in the neutrino sector. Thus the processes of LFV in the charged lepton sector are also, in principle, available. In this work, we investigate the rare muon decay $\mu \to e\gamma$ in the left-right symmetry model, based on $SU(3)_C \otimes SU(3)_L \otimes SU(3)_R \otimes U(1)_X$ gauge group (for short 3-3-3-1 model). After briefly introducing the model, we will present the formula expression and carry out numerical analysis of the branching ratio of the process.

Presenter: Nguyen Tuan Duy

P.45 – Poster, NCTP-43

Entanglement and quantum teleportation via the plus-photon-added two-mode squeezed vacuum state

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(1) Center for Theoretical and Computational Physics, College of Education, Hue University; (2) University of Transport and Communications, Campus in Ho Chi Minh city

This paper introduces a state called plus-photon-added two-mode squeezed vacuum state by adding simultaneously plus photons on the both modes of two-mode squeezed vacuum state. By using the linear entropy and the EPR correlation, it is shown that the plus-photon-added two-mode squeezed vacuum state is entangled state and the entanglement degree of this state can tend to the highest degree. Using such state as an entanglement resource to teleport a coherent state, the average fidelity of the quantum teleportation process approaches to unit in the limit of the big amplitude values of the plus-photon-added two-mode squeezed vacuum state.

Presenter: Trần Quang Đạt

P.46 – Poster, NCTP-43

Molecular Kondo effect in flat-band lattices

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Institute of Physics, Vietnam Academy of Science and Technology, Hanoi 100000, Vietnam.

The Kondo effect of a single magnetic impurity embedded in the Lieb lattice is studied by the numerical renormalization group. When the band flatness is present in the local density of states at the impurity site, it quenches the participation of all dispersive electrons in the Kondo singlet formation, and reduces the many-body Kondo problem to a two-electron molecular Kondo problem. A quantum entanglement of two spins, which is the two-electron molecular analog of the many-body Kondo singlet, is stable at low temperature, and the impurity contributions to thermodynamical and dynamical quantities are qualitatively different from that obtained in the many-body Kondo effect. The conditions for existence of the molecular Kondo effect in narrow band systems are also presented.

Presenter: Nguyen Thi Thuy

P.47 – Poster, NCTP-43

Tuning electronic transport properties of the V-shaped edge distorted zigzag

graphene nanoribbons with substitutional doping

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Density-functional theory (DFT) in combination with the nonequilibrium Green's function formalism is used to study the effect of substitutional doping on the electronic transport properties of V-shaped edge distorted zigzag graphene nanoribbons (DZGNR). We consider DZGNR terminated by H atoms with four, six, eight zigzag carbon chains respectively. In this work, Si atoms are used to substitute carbon atoms located at the center of the samples. Our calculated results have determined that Si can change the material type by the number of dopants. We found that the transmission spectrum depends on number chains of the sample and location of dopant: the largest transmission is obtained for eight chains, and the single doping in the middle of the samples give larger transmission. The obtained results are explained in terms of electron localization in the system due to the presence of impurities. The relationship between the transmission spectrum, the device density of states and the I-V curve indicates that DZGNR can be applied well in electronic nanodevices.

Presenter: Nguyen Thanh Tien

P.48 – Poster, NCTP-43

Molecular dynamics study of pressure effect on structure of CuNi alloy

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The structure of CuNi alloy has been investigated by means of molecular dynamic (MD) simulation. The interactions between atoms of the system were calculated by Sutton-Chen type of embedded atom method. The results show that when the sample was cooled down from 2000K to 300K at the cooling rate of 0.01 K/ps, both Ni and Cu atoms are crystallized into face centered cubic (fcc) and the hexagonal close packed (hcp) phases. The transformation to crystalline phase is analyzed through the Common Neighbor Analysis (CNA) methods. Further, we focus on the dependence pressure on the structure of CuNi alloy.

Presenter: Nguyen Thi Thao

P.49 – Poster, NCTP-43

Optically detected electrophonon resonance in a special asymmetric hyperbolic-type quantum well

Pham Tuan Vinh (1,2), Le Dinh (1)

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In this work, we study the absorption power in a special asymmetric hyperbolic-type when electrons are scattered with longitudinal optical phonons (LO-phonons). The explicit analytic expression for absorption power is obtained using the projection operator technique. Conditions for optically detected electrophonon resonance (ODEPR) are obtained based on the energy conservation law. Computational results show that the absorption power as well as the full

width at half maximum (FWHM) of the ODEPR peaks increase with temperature and decrease with the characteristic parameters of the quantum well. Moreover, these results also show the agreement with previous studies in both theoretically and experimentally.

Presenter: Phạm Tuấn Vinh

P.50 – Poster, NCTP-43

High-order expanded XAFS cumulants of DIA crystals on classical anharmonic correlated Einstein model

Tong Sy Tien (1), Nguyen Van Hung (2), Nguyen Tho Tuan (3), Nguyen Van Nam (3)

(1) University of Fire Fighting & Prevention; (2) VNU University of Science; (3) Hong Duc University

Temperature dependence of the high-order cumulants in the extended XAFS (X-ray Absorption Fine Structure) of DIA crystals have been studied based on anharmonic correlated Einstein model and classical statistical theory. Analytical expressions of thermodynamic parameters and the first four XAFS cumulants have been derived high-order anharmonic effective potential, where the Morse potential is used to characterize interaction between each pair of atoms and expanded to the fourth-order. Numerical results for Ge in the temperature range from 0 K to 900 K are found to be in good agreement with experimental values and the statistical moment method.

Presenter: Tống Sỹ Tien

P.51 – Poster, NCTP-43

An economical scheme for creation of a desired quDit state

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Concrete tasks in quantum information processing demand their relevant input states. Therefore, creation of quantum states with specific characteristics is necessary. Of our interest is a pure quDit state $|\Psi\rangle = \sum_{n=0}^{D-1} \alpha_n |n\rangle$ with desired complex coefficients α_n. In fact, such a state can be created by various schemes which were already described in the literature. However, all the existing schemes suffer from certain limitations. They are complicated relying on entangling transformations and/or measurements so that the implementation is either probabilistic or needs ancilla dimensions. Here we propose an economical scheme which is deterministic and requires only an initial quDit in the simplest state $|0\rangle$. Namely, we explicitly construct the form of a unitary operator which when acting on $|0\rangle$ directly produces the desired quDit state $|\Psi\rangle$ without any measurements. We also discuss on how to optically realize our constructed unitary operator.

Presenter: Le Thanh Dat

P.52 – Poster, NCTP-43

Hydrogen storage in metal organic framework MIL-88D

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MIL-88 series has been evaluated for gas storage, capture, and separation in recent years. Especially, MIL-88D is rather stable in humid environments and can swell up to 240% compared to its initial volume. This outstanding feature has attracted our attention to consider the hydrogen storage in MIL-88D. In this work, we substitute the iron in the original structure of MIL-88D by Al, Sc, and Ga metals to enhance the hydrogen storage capacity. The force field parameters were prepared through the van der Waals dispersion-corrected density functional theory calculations. By using the grand canonical Monte Carlo simulation, we computed the hydrogen storage capacity at the temperatures of 77 K and 298 K and the pressures under 100 bar. We found that MIL-88D is very promising for the hydrogen storage. From the obtained results, we could find the best metal for the Fe replacement.

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Presenter: Do Son

P.53 – Poster, NCTP-43

The effects of external electric fields on the energy gap and its properties of bilayer zigzag graphene nano-ribbons

Huynh Huyen Tran, Nguyen Thi My The

College of Natural Sciences, Can Tho University

As we have known that graphene is a superior material for conductivity, durability and thinness. However, graphene has a major problem with its properties, it does not have large enough the energy gap to control the on/off current like semiconductor material. We investigate the effects of external electric fields on the electronic properties of bilayer armchair graphene nano-ribbons. Using atomistic simulations with Tight Binding calculations and the Non-equilibrium Green function formalism, we demonstrate that (i) in semi-metallic structures, vertical fields impact more effectively than transverse fields in terms of opening larger bandgap, showing a contrary phenomenon compared to that demonstrated in previous studies in bilayer zigzag graphene nano-ribbons; (ii) in some semiconducting structures, if transverse fields just show usual effects as in single layer armchair graphene nano-ribbons where the bandgap is suppressed when varying the applied potential, vertical fields exhibit an anomalous phenomenon that the bandgap can be enlarged. Although the combined effect of two fields does not enlarge the bandgap as found in bilayer zigzag graphene nano-ribbons, it shows that the mutual effect can be useful to reduce faster the bandgap in semiconducting bilayer armchair graphene nano-ribbons. These results are important to fully understand the effects of electric fields on bilayer graphene nano-ribbons (AB stacking) and also suggest appropriate uses of electric gates with different edge orientations. The desire to control this barrier width in the most effective way possible to meet the graphene application needs into electronic technology in the future.

Presenter: Huynh Huyen Tran

P.54 – Poster, NCTP-43

Unitary of neutrino mixing matrix

Nguyen Thi Kim Ha (1), Nguyen Thi Hong Van (2)

(1) Ho Chi Minh University of Science, and Institute of Physics and Institute For Interdisciplinary Research Science and Education (IFIRSE), (2) Institute of Physics (IOP) and Institute For Interdisciplinary Research Science and Education (IFIRSE)

Neutrinos are neutral leptons which exist three types of neutrinos (electron neutrinos, muon neutrino and tau neutrino). These classifications are referred to as a neutrino's "flavor". The flavor of a neutrino is determined as a superposition of the mass eigenstates. The type of the flavor oscillation is called neutrino oscillation that occurs when neutrinos have mass and non-zero mixing. Neutrino mixing is governed by the PMNS mixing matrix which relates the mass eigenstates to the flavor eigenstates. The PMNS mixing matrix is constructed as the product of three independent rotations (a unitary matrix with three mixing angles and one phase). From that, we describe the numbers by showing in a graphical form called the unitarity triangle to give rise to CP violation. At the same time, we calculate the four parameters of mixing matrix to draw unitary triangle. The area of the triangle is a measure of the amount of CP violation caused by the weak force.

Presenter: Nguyen Thi Kim Ha

P.55 – Poster, NCTP-43

Electronic phase diagram for the half-filled Hubbard model with disorder

Hoang Anh Tuan and Nguyen Thi Hai Yen

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The electronic phase diagram of strongly correlated systems with disorder is constructed using the typical-medium theory. For half-filled system, the combination of the linearized dynamical mean field theory and equation of motion approach allows to derive the explicit equations determining the boundary between the correlated metal, Mott insulator, and Anderson insulator phases. Our phase diagram is consistent with those obtained by the more sophisticated methods.

Presenter: Hoang Anh - Tuan

P.56 – Poster, NCTP-43

Zero bias anomaly formation due to hopping mechanism in the two-site Anderson-Hubbard model

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The Anderson-Hubbard model considers the correlation between disorder and interaction in the strongly correlated electron systems. Both disorder and on-site Coulomb interaction drive metal-insulator transition at half-filling but the density of states behaves in different ways around a Fermi energy. A zero bias anomaly (ZBA) referring to a V-shaped anomaly of the density of states at the Fermi energy occurs in the strong disorder and strong interaction in stead of a hard Coulomb gap in an insulator phase of strongly correlated electron systems at half-filling. In this talk, we will use an Gaussian distribution for disorder to analyze the interplay of disorder and interaction in the formation of the ZBA in a two-site system for the Anderson-Hubbard model. The phase diagram of ground states with different numbers of electron reveals two important configurations in which the hopping mechanism between nearest neighbors are favored to reduce

the degeneracy of the ground state energy in the atomic limit, which results in the formation of the ZBA.

Presenter: Bach Huong Giang

P.57 – Poster, NCTP-43

Investigating the diffusion processes of Na ions in cathode material $Na_2Mn_3(SO_4)_4$ by using density functional theory

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Rechargeable Sodium-ion battery has attracted many scientists in the field of energy storage because it can be expected as an alternative one for Lithium-ion batteries. For the cathode materials of sodium-ion batteries, Na2M3(SO4)4 (M: a transition metal) is one of promising materials. Although the predictions for diffusion processes of Na ions have been made using the concept of bond valence sum based on X-ray diffraction data on crystals [1], the detail of diffusion mechanism has not still been fully explored yet. In 2012, V. A. Dinh et al. proposed a new insight in describing the diffusion of Li/Na ion with accompanied by a quasi-particle so called small polaron to explore the diffusion inside cathode materials [2-4]. For Na2M3(SO4)4, the removal or insertion of Na ion would lead to the formation of a bound polaron at the transition metal site. Consequently, the diffusion of the charge carriers in this material would be accompanied by the polaron migration. In this talk, we present the DFT calculation of crystal and electronic structures of Na2Mn3(SO4)4. The diffusion process of Na ion in this material will be illustrated through the elementary diffusion processes (EDPs) of Na vacancy and accompanying polaron. The diffusion pathways are explored and activation barrier will be evaluated via combination of EDPs.

Presenter: Tran Thien Lan

P.58 – Poster, NCTP-43

Theoretical predictions of two-dimensional covalent organic frameworks (COF) with triangular topologies

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In the last decades, covalent organic frameworks (COFs) – the class of highly ordered organic crystalline porous, have attracted huge research interest because of their unique structures and potential applications in gas separation/storage, catalysis, energy storage and optoelectronic materials device. In this works, we proposed several series of triangular topologies to study the applicability of the formation of two-dimensional (2D) COFs from various pre-defined individual building blocks using Density Functional based tight-binding (DFTB) method. Different high-symmetry stacking, e.g. AA and AB stacking sequence are also designed and investigated. The designed series band gaps are found to be ranging from 0 eV to 2.93 eV. Furthermore, the COF series, revealing a variety of promising mechanical and electronic properties, which can potentially find future realistic applications.

Keywords: Covalent organic frameworks (COF), density functional theory (DFT), structure prediction

Presenter: Trinh Thi Phuong

P.59 – Poster, NCTP-43

The effect of a strong laser electric field on the absorption spectrum of excitons in GaAs/AlGaAs quantum wires

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In this work, we study the effect of a strong laser electric field on the absorption spectrum of excitons in GaAs/AlGaAs quantum wires. We apply the renormalization wavefunction theory to a three level model irradiated by a strong laser wave resonant with two level of electrons. Results show that the exciton absorption spectrum is separated into two distinct absorption peaks due to the optical Stark effect. The appearance of those two peaks provides an evidence of the separation of the electron levels. In addition, when we change the size of the structure, the absorption spectrum of excitons shifts to a different energy band. This fact clearly reveals the quantum confinement effects in the semiconductor quan-tum wires.

Key words. Absorption spectrum, exciton, optical Stark effect, quantum wire, GaAs, Al-GaAs.

Presenter: Dương Đình Phước

P.60 – Poster, NCTP-43

Algebraic method for atoms with two electrons

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The Hamiltonian for atom with two electrons is represented in the algebraic form via the quantum annihilation and creation operators, thus the algebraic method can be used to solve the problem. Here, a basic set in the algebraic form given as a set of eight-dimensional harmonic oscillator wave functions is useful for calculating, and, from other side, characterizes the Coulomb interaction wave functions, that makes the considered problem very effective to solve. This method can be developed for other more complex atomic systems such as a helium atom in a magnetic field.

Presenter: Ly Duy Nhat

P.61 – Poster, NCTP-43

Theoretical predictions of two-dimensional covalent organic frameworks (COF) with hexagonal topologies

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Recently, covalent organic frameworks (COFs) - a new class of highly ordered organic crystalline porous polymers, have attracted huge research interest because of their unique structures and potential applications in gas separation/storage, catalysis, energy storage and optoelectronic materials development. We have studied several structure's series of hexagonal shapes to explore the applicability of the formation of two-dimensional (2D) COFs from various pre-defined individual building blocks using Density Functional based tight-binding (DFTB) method. Different high-symmetry stackings, e.g. AA and AB stacking sequence are also designed and investigated. The designed series's band gaps are found to be ranging from 1.34 to 2.93 eV. Further, the COF series, revealing a variety of promising mechanical and electronic properties, which can potentially find future realistic applications.

Keywords: Covalent organic frameworks (COF), density functional theory (DFT), structure prediction

Presenter: Le Nam Duong

P.62 – Poster, NCTP-43

Magneto-thermoelectric effects in rectangular quantum wire with an infinitely high potential in the presence of electromagnetic wave (electron-acoustic phonon interaction)

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Based on the quantum kinetic equation for electrons, we have theoretically studied the influence of a Strong Electromagnetic Wave on the Ettingshausen Effect in a rectangular quantum wire with an infinite potential. We obtain the analytic expressions for the kinetic tensor as well as the Ettingshausen coefficient in the rectangular quantum wire with an infinite potential with the dependence on B and Ω. The results are numerically evaluated and graphed for GaAs/GaAs:Al quantum wire. We survey the electrical and thermal conductivity tensor depend on Electromagnetic Wave frequency and temperature. The results give us appearance of the Shubnikov–de Haas oscillations when we survey the dependence of Ettingshausen coefficient on the magnetic field. Then, we realize that as the temperature increases, the Ettingshausen coefficient decreases. This shows that the Electromagnetic Wave have a clear impact on the effects. These are latest results which have been studied in terms of Ettingshausen effect in rectangular quantum wire. Keywords: Quantum wire, Ettingshausen effect, Quantum kinetic equation.

Presenter: Tran Hai Hung

P.63 – Poster, NCTP-43

The influence of confined phonons on Ettingshausen effect in Quantum well with parabolic potential in the present of electromagnetic wave

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By using the quantum kinetic equation for electrons with the present of invariable electromagnetic field and electromagnetic wave (EMW), we have carefully calculated and obtained the analytic expression for Ettingshausen coefficient (EC) in the Quantum Well (QW) with parabolic

potential (QWPP) when considering the confinement of both electrons and phonons. In addition, we are interested in the interaction between electrons and acoustics phonons. Expressions show that EC depends in a complicated way on the temperature, the magnetic field, characteristic quantities of EMW and the m-quantum number being specific to the confined phonons. These dependencies are clearly displayed when we apply numberial method for GaAs/GaAsAl QW. Especially, if the detention index of the phonon is set to zero, we will achieve results which are suitable for the published research about the magneto-thermoelectric effect in the same QW without phonon confinement. Finally, the results we get are new and not found in the previous research.

Presenter: Nguyen Quang Bau

P.64 – Poster, NCTP-43

Higgs decays h→Z gamma in the 3-3-1 model with beta=0

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The decays of the Higgs boson h→Z gamma are discussed in the 3-3-1 model with beta=0. Analytic formulas for one-loop contributions was constructed used well-known general results. We will show that new particles appeared in the 3-3-1 models with beta=0 may give significant contributions to the branching ratio of the standard model-like Higgs. From numerical investigation, we will show more detailed some properties of this decay. They may be useful for comparing with the experimental result that will be detected in the future.

Presenter: Trinh Thi Hong

P.65 – Poster, NCTP-43

Fermionized Heisenberg model on a non-Bravais lattice: Exact local constraint

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We study magnetic orders of the Heisenberg model on a non-Bravais lattice based on the Popov-Fedotov trick for exactly treating the local constraint on on-site spin number. The spin operators are represented by auxiliary fermions and an imaginary chemical potential is introduced. The following steps are performed: i) Classical ground state is parameterized by a magnetic ordering vector and angles between the spins within a unit cell. ii) Going to a local coordinate system. ii) Using functional integral representation for partition function and calculating determinants of block matrices by Powel method. We obtain general formulae for sublattice magnetization, free energy and other thermo-dynamical quantities for non-Bravais lattice structures in magnetically ordered phases in the framework of one loop approximation. For illustration we obtain some explicit expressions for a honeycomb lattice and compare them with the slave results.

Presenter: Pham Thi Thanh Nga

P.66 – Poster, NCTP-43

The development of cosmological perturbation in modified gravity of f(R) of polynomial-exponential form

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In this paper, we investigate the development of cosmological perturbation in early time in modified gravity of f(R) of polynomial exponential form. Results show that there is a difference that can be observed in the development of perturbation in the model from that in standard ΛCDM model. Growth index of universe $\gamma(z)$ also be obtained in the paper and shows that it differs from that in ΛCDM and also is consistent with observations. Key words: cosmological perturbation; polynomial-exponential form; modified gravity; growth index of universe

Presenter: On Van Vo

P.67 – Poster, NCTP-43

A study of the optical Stark effect in InAs/GaAs quantum wells

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In this paper, we study the optical Stark effect of excitons in InAs/GaAs quantum wells using renormalization wavefunction formulation. We investigate the absorption spectrum of excitons in an infinite quantum well model under the effect of a strong pump laser resonant with two electron quantized levels. We also deduce the dependence of the absorption probability on the well width and the pump laser detuning.

Presenter: Lê Thị Ngọc Bảo

P.68 – Poster, NCTP-43

Magneto-optical absorption and cyclotron-phonon resonance in monolayer molybdenum disulfide

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In this work, utilizing projection operator technique, we theoretically calculate the magneto-optical absorption coefficient in monolayer molybdenum disulfide, taking account of electron-optical phonon interaction at high temperature. Both phonon emission and absorption processes are considered. The cyclotron-phonon resonant effect is observed in the absorption spectra. The full width at half maximum (FWHM) of resonant peaks is obtained. The FWHM is found to be proportional to the square root of magnetic field and slightly increase with temperature.

Presenter: Bùi Đình Hợi

P.69 – Poster, NCTP-43

Advanced design of VVER1000 fuel assembly with burnable absorber

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In the traditional design of LWRs, a few percent of burnable absorber, e.g. Gd2O3, is mixed homogeneously in the fuel rods of several assemblies for controlling excess reactivity and flattening the power distribution. However, the content of burnable absorber would lead to the decrease of the thermal conductivity of the fuel rod. To avoid the problem, an advanced design of the VVER-1000 fuel assembly has been investigated using micro-particles of burnable absorber.Numerical analysis has been conducted using the Monte Carlo neutron transport MVP code for optimizing the parameters of burnable absorber. It is found that by using the micro-particles of burnable absorber and distributing them more evenly, it is possible to decrease the power peaking factor by about 5%, while improving the thermal conductivity of the fuel rod.

Keywords:VVER1000, fuel assembly, burnable absorber

Presenter: Tran Hoai Nam

P.70 – Poster, NCTP-43

Progress in modeling of deuteron induced reactions within the modern nuclear interactions

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In this work, the (d,p) reactions off medium and heavy targets are investigated within the Faddeev-AGS framework. The NN Paris potential inseparable form has been implemented. For two-body NA interaction, we adopt the non-local energy-dependent complex microscopic optical potential [1,2] which is directly generated from the NN effective phenomenological Skyrme interaction. The microscopic character of this optical potential allows us to make the predictions in the exotic regions. Starting from this optical potential, a separable representation thereof is introduced based on the generalized Ernst-Shakin-Thaler (EST) scheme. We will present the short and long-term perspectives to implement this NA potential into the Faddeev-AGS code. [1] T. V. Nhan Hao et al. Physical Review C 92, 014605 (2015). [2] T. V. Nhan Hao et al. International Journal of Modern Physics E (2018), accepted.

Presenter: Nguyen Hoang Tung

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