Joint ICTP-VAST-APCTP Regional School in Theoretical Physics

Topological Phases and Quantum Computation

Hanoi, 9-20 December 2013

ARRIVAL INFORMATION

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Some Vietnamese sentences

AT NOIBAI AIRPORT

I. Getting visa on arrival

1. Please prepare the following documents:

   - Valid passport
   - Two passport photos with size 4cm x 6cm (or 2in x 2in)
   - A copy of the visa approval letter of the immigration department
   - Cash in USD (45 USD for single entry visa, 65-95 USD for multiple entry visa)

2. At Noibai airport

   Please find "Visa upon arrival" counter (see the picture below). It locates nearby the checking points of the immigration department. Show your documents to the officers, and they will give the visa stamp in your passport.

II. Getting to the Governmental Guest House

Take taxi from the airport to the Governmental Guest House. The taxis stand at the terminal exit. The cost for taxi from the airport to Governmental Guest House is 350 000 VND. Show the following address to the taxi driver:

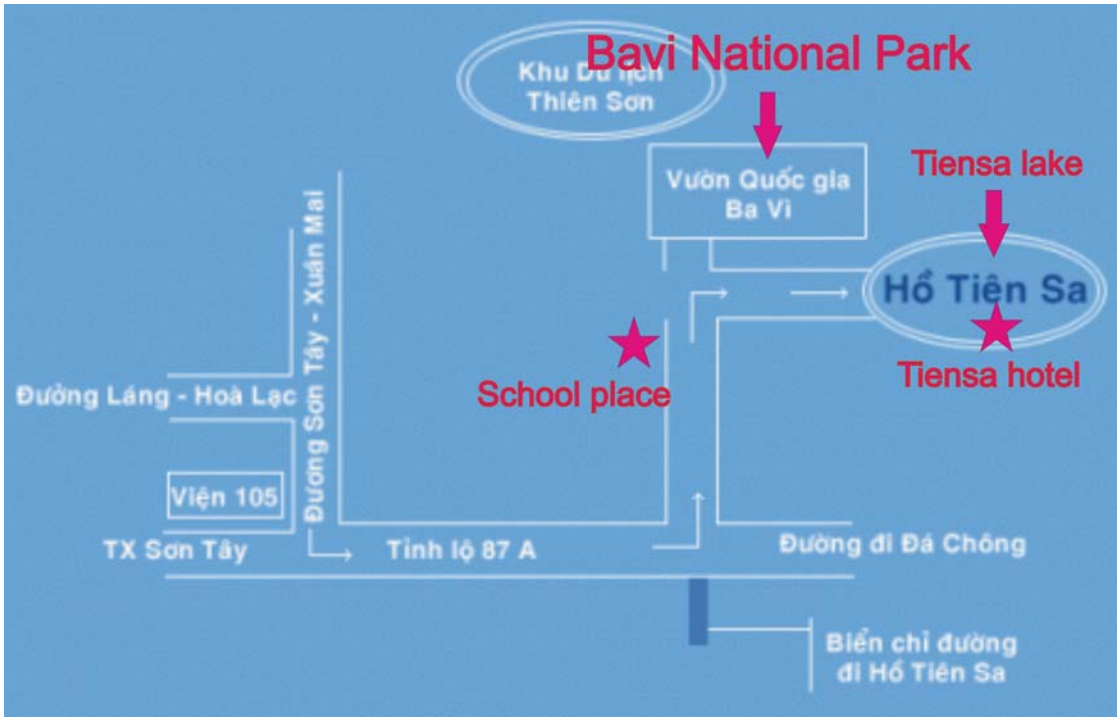
NHÀ KHÁCH CHÍNH PHỦ

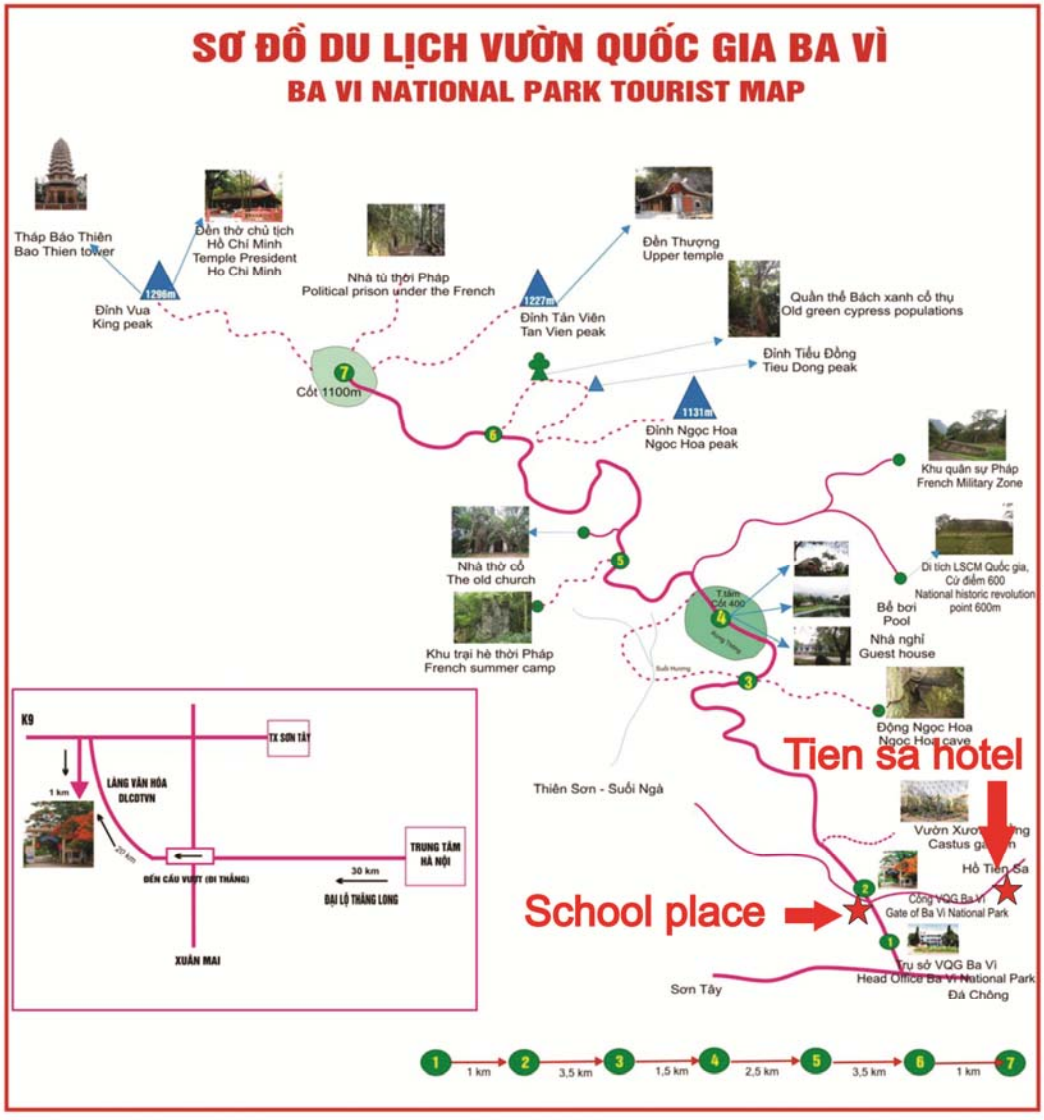
SỐ 2, PHỐ LÊ THẠCH, QUẬN HOÀN KIẾM, HÀ NỘI

III. Getting to the Bavi National Park place

If you want to go directly from the Noibai airport to the Bavi National Park by taxi, please check it with the local organizers in advance, because the Bavi National Park is a rural area, and the roads are complicated. Show the taxi driver the schematic road map below.

The school place is directly at the left hand side of the entry gate of the Bavi National Park. The hotel (Tiensa hotel) locates approximately 1km from the entry gate of the Bavi National Park, in the right hand side direction, and at the Tiensa lake (Ho Tien Sa).




SƠ ĐỒ DU LỊCH VƯỜN QUỐC GIA BA VÌ
BA VI NATIONAL PARK TOURIST MAP
Tháp Báo Thiên
Bao Thien tower
Đền thờ chủ tịch
Hồ Chí Minh
Temple President
Ho Chi Minh
1296m
Đỉnh Vua
King peak
Nhà tù thời Pháp
Political prison under the French
Cột 1100m
1227m
Đỉnh Tản Viên
Tan Vien peak
Đền Thượng
Upper temple
Quần thể Bách xanh cổ thụ
Old green cypress populations
Đỉnh Tiểu Đồng
Tieu Dong peak
1131m
Đỉnh Ngọc Hoa
Ngoc Hoa peak
Khu quân sự Pháp
French Military Zone
Nhà thờ cổ
The old church
Khu trại hè thời Pháp
French summer camp
Di tích LSCM Quốc gia,
Cứ điểm 600
National historic revolution
point 600m
Bể bơi
Pool
Nhà nghỉ
Guest house
Động Ngọc Hoa
Ngọc Hoa cave
Tien sa hotel
Thiên Sơn - Suối Ngà
Vườn Xương rồng
Castus ga
Hồ Tiên Sa
School place
Cổng VQG Ba Vì
Gate of Ba Vi National Park
Trụ sở VQG Ba Vì
Head Office Ba Vi National Park
Đá Chông
Sơn Tây
K9
TX SƠN TÂY
1 km
LÀNG VĂN HÓA
DLCĐTVN
20 km
ĐẾN CẦU VƯỢT (ĐI THẲNG)
30 km
ĐẠI LỘ THĂNG LONG
TRUNG TÂM
HÀ NỘI
XUÂN MAI
1 km
3,5 km
1,5 km
2,5 km
3,5 km
1 km

IN HANOI

Governmental Guest House

1 Hoan Kiem lake
2 Ngoc Son temple
3 Thang Long water puppet theatre
4 Hanoi Cathedral
5 Army museum
6 Imperical citadel

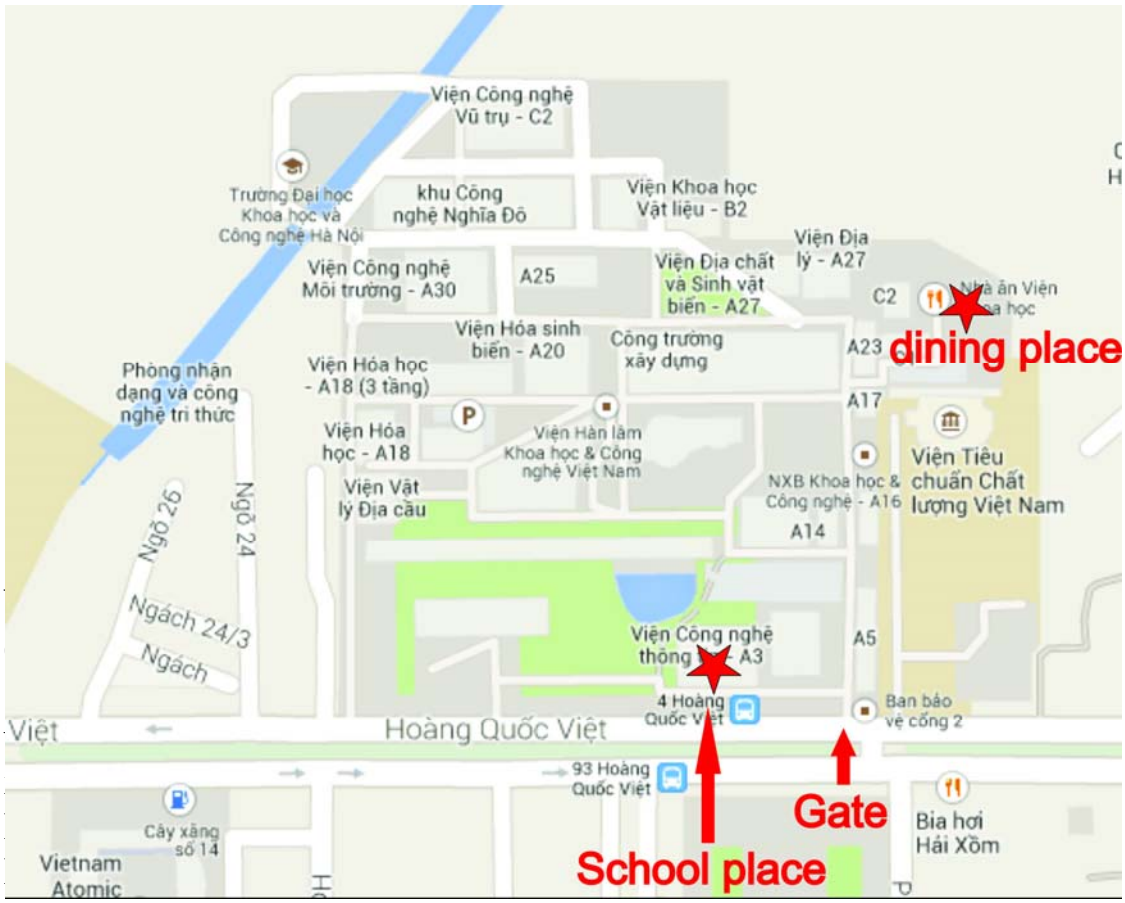
7 Fine art museum
8 Temple of Literature
9 Hoalo prison (”Hilton hotel”)
10 Hanoi Opera House
11 Museum of History
12 Museum of Modern History

The Governmental Guest House locates at the center of Hanoi, and nearby the old quarter of Hanoi. There are many sightseeing and entertainment places, such as Hoan Kiem lake, Ngoc Son temple… Please be careful when crossing streets and take care of your things in crowded places.

School place in Hanoi

The school place locates at the Institute of Information Technology, Vietnam Academy of Science and Technology. Its address is

Block A3 - 18 Hoang Quoc Viet Road – Hanoi



School schedule

In the first week (9-13 December) the School will take place in Hanoi at the Institute of Information Technology, while in the second week (14-20 December) it will take place at Bavi National Park.

During the first week, we will provide a shuttle bus from the Governmental Guest House to the School place and vice versa.

TIME TABLE OF SHUTTLE BUS **from 9 to 13 December 2013**	
8:30	Governmental Guest House
8:55	Institute of Information Technology
19:00	Institute of Information Technology
19:25	Governmental Guest House

First week schedule

	Monday 9-12	Tueday 10-12	Wednesday 11-12	Thurday 12-12	Friday 13-12	Saturday 14-12
8.30-9.00	Registration					
9 - 10	Opening ceremony	Mussardo	Chuang	Lauchli	Nagaj	
10 -11	Nagaj	Mussardo	Nagaj	Ludwig	Chuang	
break						
11.30-12.30	Mussardo	Ludwig	Ludwig	Chuang	Lauchli	Moving to Bavi
	Lunch	Lunch	Lunch	Lunch	Lunch	
14-15	Lauchli	Chuang	Lauchli	Wan		
15-16	Lauchli	Wan	Wan	Wan		
break						
16.30-17.30		Nagaj				
18-19	Banquet	Diner	Diner	Diner	Diner	Diner

The second week schedule will be provided latter.

LECTURES

Andreas Lauchli (Universität Innsbruck Institut für Theoretische Physik)
"Computational Approaches to Quantum Many Body Systems"
Topics:

1. Exact Diagonalization and applications
2. DMRG/Tensor Network Methods and applications
3. (Quantum) Monte Carlo Methods and applications

Giuseppe Mussardo (SISSA-Trieste)
"Introduction to Anyon Systems"
Topics:

1. Spin-statistics
2. Braid group
3. Rules of the game
   (a) Fusion rules
   (b) Associatity: F-matrix
   (c) Braiding
4. Quantum dimensions
5. Topological computation

Xin Wan (Zhejiang Institute of Modern Physics)
"Anyons and quantum computation in quantum Hall systems"
Topics:

1. 2D electron gas, FQHE and anyons
2. FQH wavefunctions and CFT
3. Moore-Read state and experiments
4. TQFT and quantum computation

Kwek Leong Chuan (Centre for Quantum Technology, Singapore)
"Entanglement Theory"
Topics:

1. What is a qubit?
2. Density matrix formalism
3. Pure and mixed states
4. Entangled states; what is entanglement?
5. Measures of bipartite entanglement
6. Bell inequalities
7. Entanglement witnesses
8. Multipartitie entanglement
9. Topological entanglement
10. Recent advances in entanglement (if I have the time)

Daniel Nagaj (Faculty of Physics, Wien)
" Introduction to Quantum Computing"
Topics:

1. Quantum computing: how and what can one do with unitaries
2. Entanglement and correlations: are they strange, are they useful?
3. Quantum error correction codes: basic tools to fight decoherence
4. Elementary quantum algorithms: what is QC good for/intro to complexity

Andreas W.W. Ludwig (University of California, Santa Barbara)
"Aspects of Topological Phases"
Topics:

1. Interactions between Non-Abelian Anyons – Analogies with Quantum Magnetism
2. Interactions in One-dimensional Systems – Exact Solution
3. Reinterpretation of One-dimensional case - broader significance, and higher dimensions
4. Introduction to Topological Insulators and Superconductors, and to their Classification (if time permits)

VIETNAMESE SENTENCES

1. **HÃY CHỞ TÔI ĐẾN NHÀ KHÁCH CHÍNH PHỦ Ở SỐ 2 PHỐ LÊ THẠCH, QUẬN HOÀN KIẾM**

   Please take me to the Governmental Guest House at 2 Le Thach street, Hanoi.

2. **HÃY CHỞ TÔI ĐẾN 18 HOÀNG QUỐC VIỆT, VIỆN HÀN LÂM KHOA HỌC VÀ CÔNG NGHỆ**

   Please take me to the Vietnam Academy of Science and Technology at 18 Hoang Quoc Viet street, Hanoi.

3. **XIN HỎI TÒA NHÀ VIỆN CÔNG NGHỆ THÔNG TIN NẰM Ở ĐÂU?**

   Could you tell me where the building of the Institute of Information Technology is?

4. **HÃY CHỞ TÔI RA SÂN BAY NỘI BÀI**

   Please take me to the Noibai airport.

5. **HÃY CHỞ TÔI ĐẾN CỔNG VÀO VƯỜN QUỐC GIA BA VÌ**

   Please take me to the entry gate of the Bavi National Park.

6. **HÃY CHỞ TÔI ĐẾN KHÁCH SẠN TIÊN SA, Ở HỒ TIÊN SA, NẰM GẦN CỔNG VÀO VƯỜN QUỐC GIA BA VÌ, RẼ PHẢI, ĐI KHOẢNG 1KM.**

   Please take me to Tien Sa hotel, nearby the entry gate of the Bavi National Park on 1km distance.