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## **APCTP Focus Program on Nuclear Physics: 2019**

**“Nuclear Many-Body Theories: Beyond the mean field approaches”**

**Venue:** APCTP Headquarters at POSTECH Campus, Pohang, Korea  
(<https://www.apctp.org>)

**Period:** July 1 (Mon), 2019 - July 10 (Wed), 2019

**Workshop homepage:** (<https://www.apctp.org/plan.php/nuclearfocus-2019>)



### **Overview & Topics**

Nuclear many-body theory is a major key to understand the structure of nucleus and nuclear matter. It has a key role in investigating the structure of compact stellar objects like neutron stars. In most cases, the mean field approximation is widely used as the first approximation to the strongly interacting nuclear systems. However, more profound understanding of nuclear matter requires theoretical tools beyond the mean field treatment. Therefore, investigation in this direction is very crucial to develop more

powerful and consistent theory for nuclear structure and nuclear matter. In this Focus Program, we will summarize the attempts made up to present and discuss the directions of future research. To establish close collaboration among participants is another goal of this program. We will start by addressing the topic of nucleon-nucleon correlations in nuclear-response theory and related subjects. The main issue is to go beyond the mean-field picture in dynamic situations not just the ground state. We will start to discuss on extended-RPA theories with a correlated ground state. This has been developed by many authors including the speakers of this Focus Program, who are experts in this field pursuing various approaches beyond the mean-field approximation. For microscopic input for many-body theory, we have to understand fundamental nucleon interactions and many-body theories based directly on the nucleon interactions. These *ab initio* models are important to fully understand the nuclear structure and nuclear response. In this program, we invite experts of the in-medium renormalization group. By inviting these world-leading experts in nuclear many-body theories, we will develop strong collaborations with them and will make chances to young people who wants to develop his/her career in this field. We will support young postdoctors and graduate students in the Asia Pacific region to encourage them to join us.

## Invited Speakers

A. N. Antonov (BAS, Bulgaria)
J. W. Clark (Washington Univ., St. Louis, USA)
H. Feldmeier (GSI, Germany)
M. Grasso (IPN Orsay, France)
J. W. Holt (Texas A&M Univ., USA)
Y. Kim (IBS, Korea)
E. Krotscheck (SUNY Buffalo, USA)
C.-H. Lee (Pusan National Univ., Korea)
Y. Lim (Texas A&M Univ., USA)
E. Litvinova (Western Michigan Univ., USA)
J. Meng (Peking Univ., China)
P. Papakonstantinou (IBS, Korea)
N. Pillet (CEA, France)
R. Roth (TU Darmstadt, Germany)
M. Tohyama (Kyorin Univ., Japan)
and more ...

## Organizers

Chang Ho Hyun (Daegu Univ.)  
Yongseok Oh (Kyungpook National Univ./APCTP)  
Panagiota Papakonstantinou (IBS)

## Contact

Should you have any questions, please contact

Yongseok Oh ([yongseok.oh@apctp.org](mailto:yongseok.oh@apctp.org))

## Accommodation

During the workshop, you will stay at POSCO International Center (PIC) which is located very close to APCTP. This is an on-campus accommodation facility of POSTECH (Pohang University of Science and Technology). We reserved rooms that will be assigned to registered participants. All reservations can be made through APCTP and there will be no direct confirmation email from PIC to participants. When you arrive at Pohang, please come to PIC as explained in Travel Information for checking-in. We are happy to support accommodations to invited participants.

## Hosted and Sponsored by

Asia Pacific Center for Theoretical Physics  
Center for High Energy Physics, Kyungpook National University

## Travel Information

APCTP website: <https://www.apctp.org/contents/index.php?idcid=111&mcode=111>

The Pohang city is situated in the south-east part of Korea and is accessible by two major international airports in Korea. Since the Incheon/Seoul (ICN) international airport is the major airport of Korea, most major airplane companies offer flights to this airport. However, there are many low-cost airlines which fly to Gimhae/Busan (PUS) international airport and several



major airline companies offer flights to Gimhae/Busan airport.

## From Incheon/Seoul International Airport (ICN) to APCTP

A. The most convenient way to Pohang is to use a limousine bus directly to Pohang Intercity Bus Terminal. The details are given below and up-to-date information can be obtained at the Information Desk at the airport.

### From INCHEON AIRPORT to APCTP - 2. Limousine bus

1. Take a Limousine Bus for Pohang Intercity Bus Terminal at Incheon Airport (5 hours)
2. Take a Taxi to APCTP (10 mins)

- TOTAL TRAVEL TIME: about 5 and a half hours
- TOTAL FARE: about KRW54,000
- WEBSITE

Incheon Airport Limousine: <http://www.airport.kr/pa/en/a/index.jsp>

1. Take a Limousine for Pohang Intercity Bus Terminal at Incheon Airport (via Gyeongju)

Departure time from Incheon Airport	Arrival time to Pohang	
07:00 (First Bus)	12:00	<ul style="list-style-type: none"><li>• BUS STOP NUMBER: 1<sup>st</sup> Floor 10C</li><li>• TRAVEL TIME: about 5 hours</li><li>• BUS FARE: KRW44,300</li></ul>
08:50	13:50	
11:40	16:40	
13:40	18:40	
17:10	22:10	
19:30	24:30	
21:30 (Last Bus)	2:30	

2. Take a Taxi to APCTP (about 10 mins, about KRW5,000)



Bus Ticket Counter of Terminal 1 (Incheon airport)



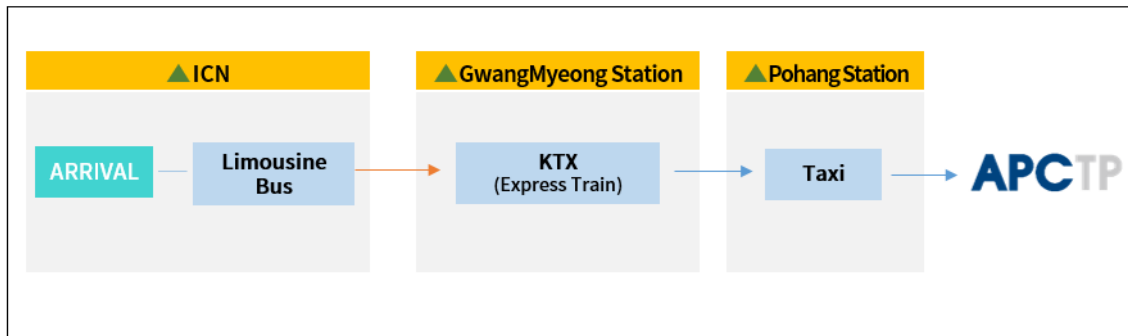
Bus Ticket Counter of Terminal 2  
(Incheon airport)

B. The fastest way would be to use KTX (express train). It takes about 3.5 to 4 hours from Incheon International Airport to Pohang. You should first take a limousine bus at the airport to GwangMyeong Station and then take KTX (express train) to Pohang Station. At Pohang Station, we recommend you to use a taxi. The direction is shown in the next page. The details of the airport can be found at <https://www.airport.kr/ap/en/index.do> . For public transportations at the airport, please visit [https://www.airport.kr/ap\\_cnt/en/tpt/pblcpt/pblcpt.do](https://www.airport.kr/ap_cnt/en/tpt/pblcpt/pblcpt.do).

You may take KTX at Seoul Station. Then you need to take a subway to Seoul Station and use KTX to Pohang Station. Once you arrive at Pohang Station, we advise you to use a taxi.

It is recommended to make a reservation for using a KTX, although not required. The ticket can be purchased at [http://www.letskorail.com/ebizbf/EbizbfForeign\\_pr16100.do?gubun=1](http://www.letskorail.com/ebizbf/EbizbfForeign_pr16100.do?gubun=1) .

## ICN-Gwangmyeong Station-APCTP



- **TOTAL TRAVEL TIME:** about 3.5~4 hours
- **TOTAL FARE:** about KRW 76,400~97,000

### 1. Take a limousine bus(#6770) for GwangMyeong Station at ICN

- **Where to take bus:**  
Arrival(1F) → 8A Gate (Bus Stop)
- **Bus Number:** 6770
- **Travel time:** about 50 min
- **Interval:** 20~30 minutes
- **Travel fare:** KRW 15,000



### 2. Take KTX for Pohang Station at Gwangmyeong Station

- **Travel time:** around 2 hours
- **Travel fare:** KRW 51,400
- **[Timetable for KTX \(Click\)](#)**
- **[Reservation \(Click\)](#):** Reservation is recommended.

### 3. Take a Taxi to APCTP (20 mins, about KRW 10,000)

C. You may also use a domestic flight to Pohang airport. For this end, you should first take a subway from Incheon International Airport to Gimpo International/Domestic Airport (GMP). Then you can take a direct flight to Pohang Airport. However, there are only two flights a day from Gimpo to Pohang and from Pohang to Gimpo. (There is NO flight from Incheon airport to Pohang airport.)

### From GIMPO AIRPORT to APCTP

1. Take a [Flight to Pohang Airport](#) at Gimpo Airport (50 mins)
2. Take a [Taxi to APCTP](#) (30 mins)

- TOTAL TRAVEL TIME: about 1 hour and a half hours

- TOTAL FARE: about KRW89000~99000

- WEBSITE

Korean Air: <https://kr.koreanair.com/global/en.html>

Gimpo Airport: <https://www.airport.co.kr/gimpoeng/main.do>

Pohang Airport: <https://www.airport.co.kr/pohangeng/main.do>

1. Take a [Flight to Pohang Airport](#) at Gimpo Airport (50 mins)

Flight days	Departure time from Gimpo Airport	Arrival time to Pohang Airport	<ul style="list-style-type: none"> <li>• TRAVEL TIME: 50 mins</li> <li>• AIRFARE: KRW91,200</li> </ul>
Mon.-Sun.	08:40	09:30	
	16:00	16:50	

2. Take a [Taxi to APCTP](#) (about 30 mins, about KRW17,000)

## From Gimhae/Busan International airport (PUS) to APCTP

If you land at Gimhae/Busan International airport, you can take a limousine bus to Pohang Intercity Bus Terminal.

### From GIMHAE AIRPORT to APCTP

1. Take a [Limousine Bus for Pohang Intercity Bus Terminal](#) at Gimhae Airport (2 hours)
2. Take a [Taxi to APCTP](#) (10 mins)

- TOTAL TRAVEL TIME: about 2 and a half hours
- TOTAL FARE: about KRW16,000
- WEBSITE

Gimhae Airport Limousine: <http://www.airport.co.kr/gimhaeeng/main.do>

1. Take a [Limousine Bus for Pohang Intercity Bus Terminal](#) at Gimhae Airport

Departure time from Gimhae Airport	Arrival time to Pohang	Departure time from Gimhae Airport	Arrival time to Pohang
07:15 (First Bus)	09:15	16:35	18:35
07:45	09:45	17:35	19:35
08:25	10:25	18:25	20:25
09:05	11:05	19:15	21:15
10:45	12:45	20:05	22:05
11:35	13:35	20:55	22:55
12:35	14:35	21:45	23:45
13:35	15:35	22:35 (Last Bus)	24:35
14:35	16:35	• TRAVEL TIME: about 2 hours • BUS FARE: KRW11,000	
15:35	17:35		

2. Take a [Taxi to APCTP](#) (about 10 mins, about KRW5,000)

The APCTP staff members will help you arrange return trips when you arrive at Pohang. Most shops and taxi drivers accept major credit cards, but we recommend you to have some cash in local currency (Korean Won).



# APCTP Travel Information

## Useful Phrases to Take a Taxi

1. ( )로 가주세요. | Could you take me to (place)?

포항공대로 가주세요. | Could you take me to POSTECH?

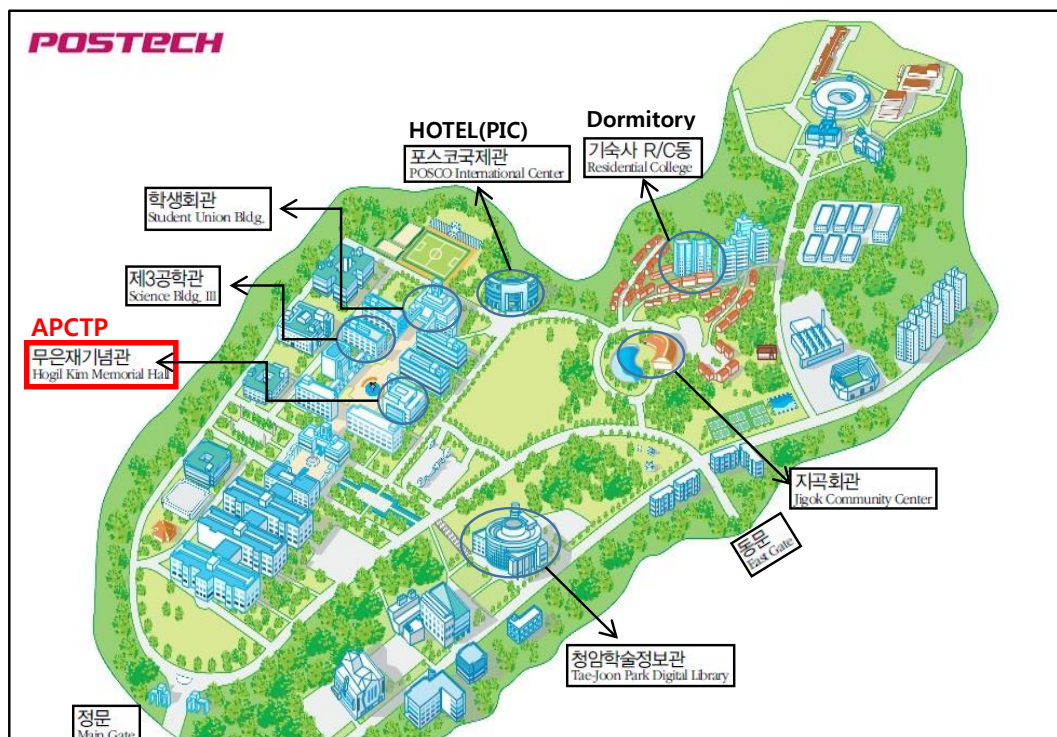
포항공대 국제관으로 가주세요. | Could you take me to POSCO International Center?

포항역으로 가주세요. | Could you take me to Pohang Station?

포항시외버스터미널로 가주세요. | Could you take me to Pohang Intercity Bus Terminal?

포항공항으로 가주세요. | Could you take me to Pohang Airport?

\*APCTP is located on the fifth floor of Hogil Kim Memorial Building (무은재기념관).



2. 영수증 주세요. | Please give a receipt.

3. 택시 좀 불러주실래요? | Could you hail a taxi for me?