Opening

AI+HEP in East Asia

Sung Hak Lim
CTPU-PTC, IBS

ibs Institute for Basic Science

WELCOME to IBS!

after difficult Sunday rush hour

from ICN to Daejeon!

Organizers:

Tianji Cai (SLAC)

Sung Hak Lim (IBS CTPU-PTC)

Huilin Qu (CERN)

Advisory Commitee:

Mihoko M. Nojiri (KEK)

David Shih (Rutgers)

Administrative Staff:

Junghyun Kim (IBS CTPU-PTC)

Jeongeun Jang (IBS CTPU-PTC)

Acknowledgements:

ibs Institute for Basic Science

KEK

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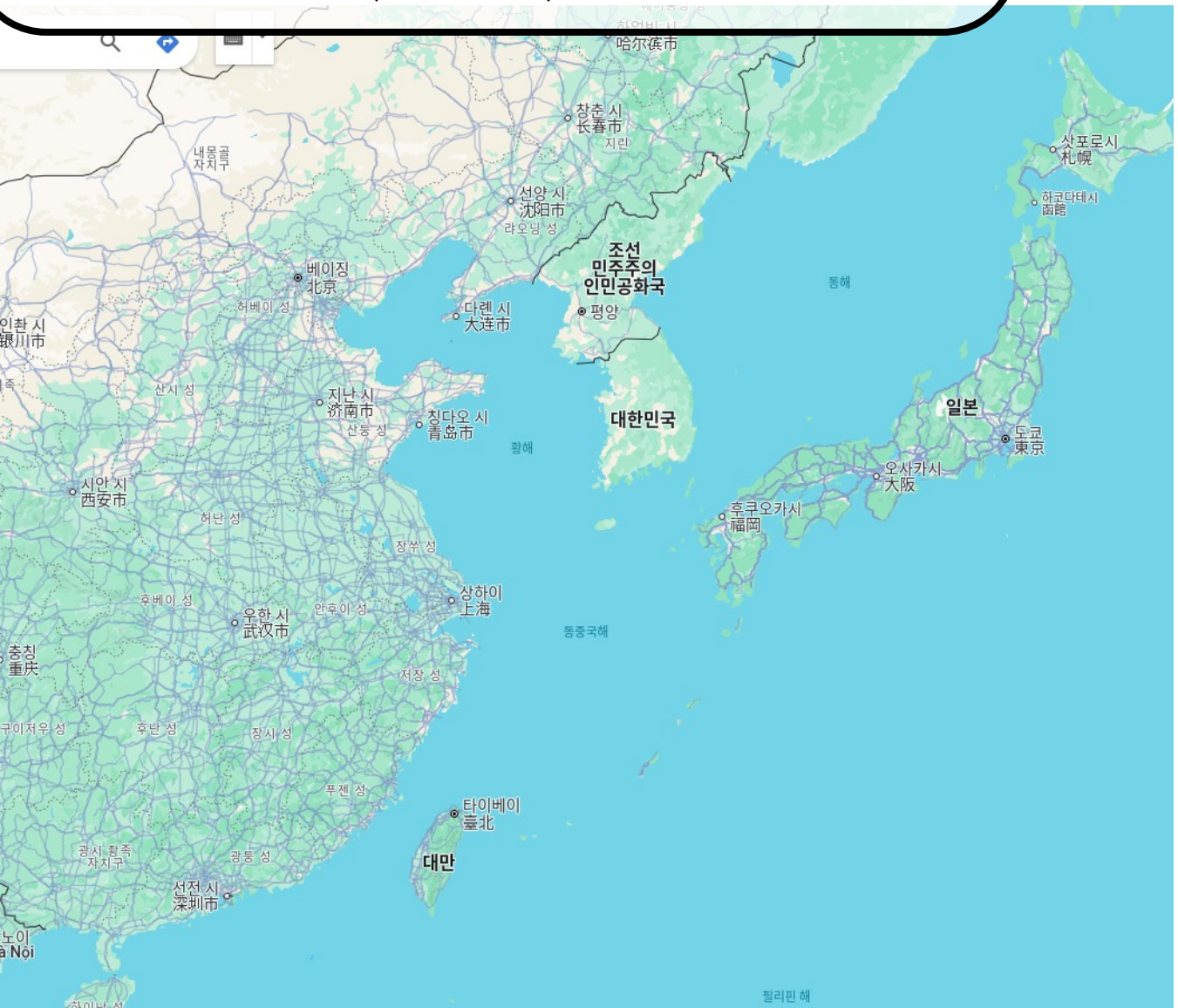
We initiated this workshop to make

East Asian researchers

in between

AI and HEP

more connected.



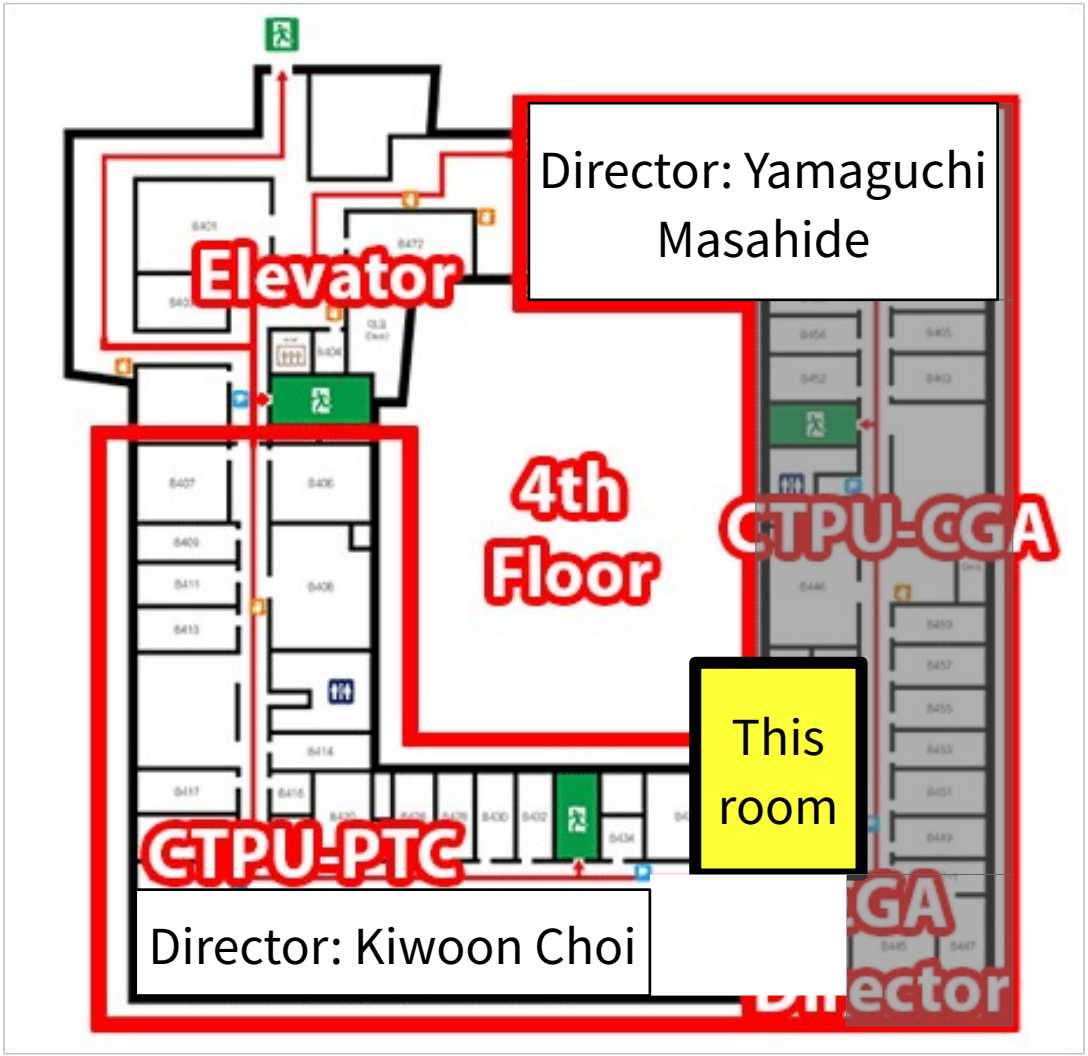
We hope you to have a fruitful time at IBS this week!

Several remarks before starting...

4th Floor Map

CTPU consists of two centers
- CTPU-PTC (Particle Theory and Cosmology Group)
- CTPU-CGA (Cosmology, Gravity and Astroparticle Physics Group)

Please mainly use **CTPU-PTC space** as this workshop is organized by CTPU-PTC.



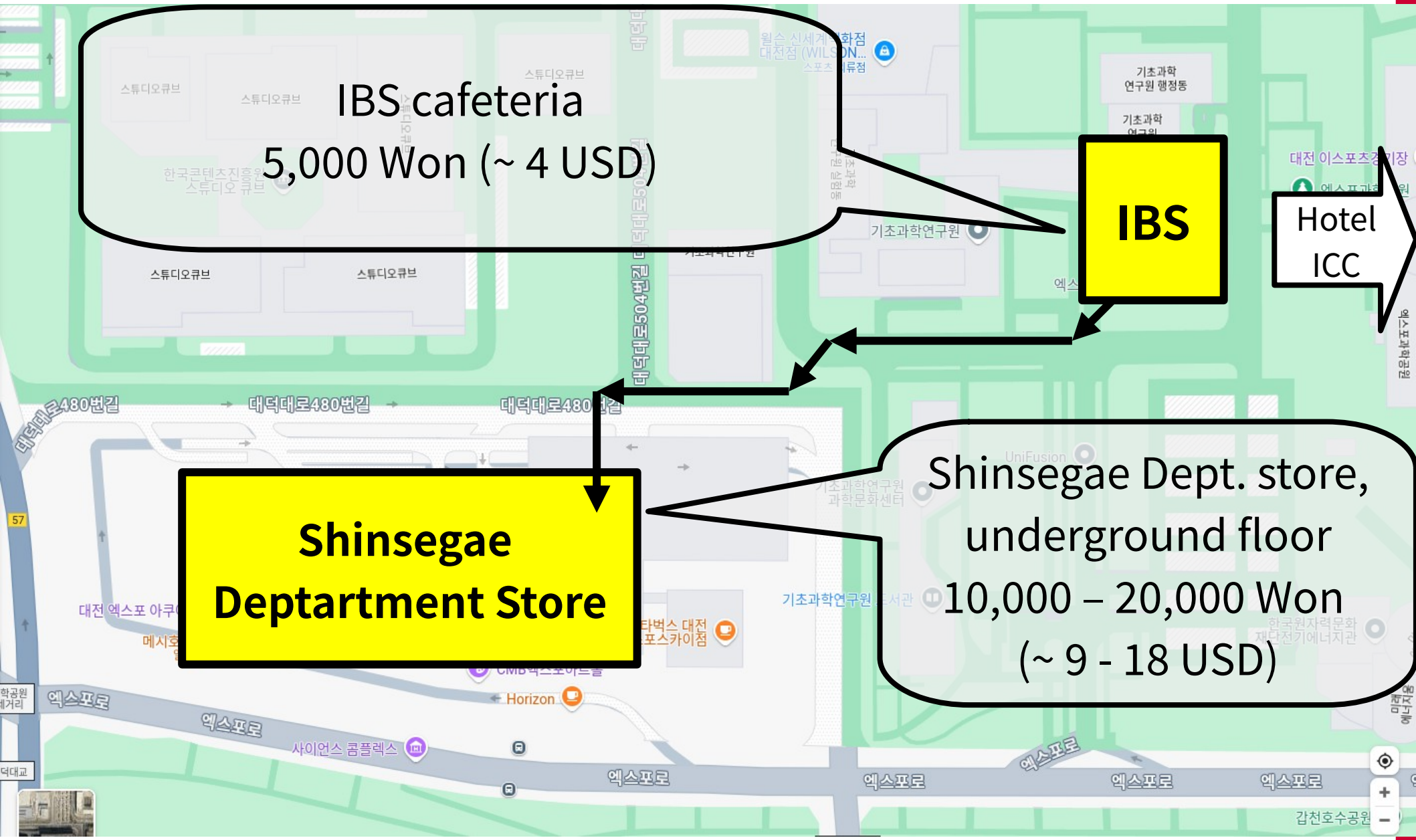
How to get in main building (from Tuesday)

Please present your **nametag** at the access checkpoint

Wifi

- Eduroam is available
- Check also public wifi password on the wall

Nearby Lunch Places



More detalid
Local map info

- Please use

  Kakao Map and Naver Map

- Google maps provides only limited services in Korea

- Please find some recommended restaurants at

  https://www.google.com/maps/d/u/0/edit?mid=1O3wtWWG8FYqlDOIYG7qUITrDcSjWRms&usp=sharing

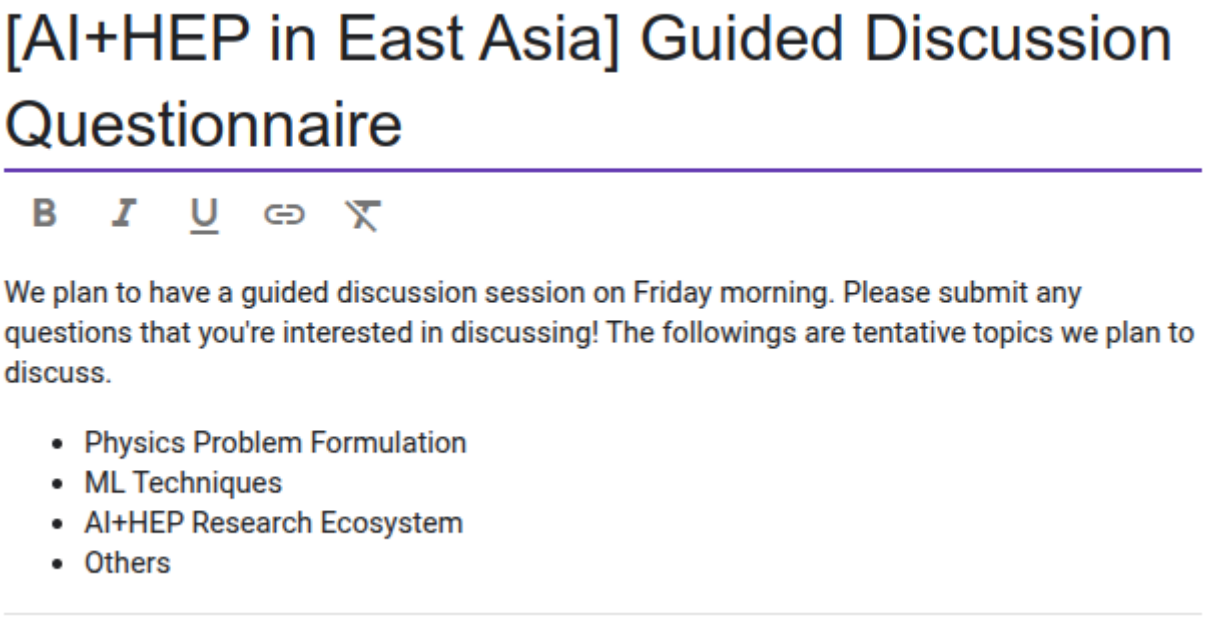
Scientific Programs

Quick Outline

- We prepared a relaxed schedule to encoruage **discussions** between participants.
- Monday: Plenary Talks
- Tue ~ Thu: Plenary and Contributed
- Friday
  - Guided Discussions
  - Workshop summary

Friday Guided Discussion Questionaire

We plan to have a **guided discussion** session on **Friday**.



[AI+HEP in East Asia] Guided Discussion Questionnaire

B I U

We plan to have a guided discussion session on Friday morning. Please submit any questions that you're interested in discussing! The followings are tentative topics we plan to discuss.

- Physics Problem Formulation
- ML Techniques
- AI+HEP Research Ecosystem
- Others

Please submit your question at:
https://forms.gle/H2Z1hZtY5domVAh37

we appreciate your cooperation!

Today's Schedule

Monday, February 24

8:50 AM → 9:20 AM — **Registration** — 30m

9:20 AM → 9:30 AM — **Opening** — 10m

Speaker: Sung Hak Lim (IBS CTPU-PTC)

9:30 AM → 12:00 PM — **Monday Talks**

Convener: Sung Hak Lim (IBS CTPU-PTC)

- 9:30 AM — **Quantum Machine Learning for High Energy Physics** — 1h
  Speaker: Myeonghun Park (Seoultech)
- 10:30 AM — **Coffee Break** — 30m
- 11:00 AM — **Modern Deep Learning for LHC Physics: Personal Insights and Reflections** — 1h
  Speaker: Congqiao Li (Peking University)

12:00 PM → 1:30 PM — **Lunch** — 1h 30m

1:30 PM → 4:00 PM — **Monday Talks**

Convener: Sung Hak Lim (IBS CTPU-PTC)

- 1:30 PM — **Weak Supervision Techniques in Collider Physics** — 1h

  In this talk, we will first review CWoLa in the broad framework of weak supervision. Taking the Dark Valley model as an explicit new physics example, we demonstrate how CWoLa can be employed to train a neural network based purely on real data and show its performance in comparison with traditional methods. By way of transfer learning and data augmentation, we illustrate how the performance can be further improved, along with discussions of trends and features of these methods.

  Speaker: Cheng-Wei Chiang (National Taiwan University)
- 2:30 PM — **Coffee Break** — 30m
- 3:00 PM — **How Can Machine Learning and Simulations Help Us Study Our Universe (and "Astronomically" Large Datasets)?** — 1h

  As astronomers and cosmologists grapple with the inherently "astronomical" size of their datasets, machine learning is rapidly being adopted in a variety of astrophysical applications. In this talk, I will showcase some examples of how it can potentially revolutionize the way we study our Universe. In one example, I will discuss how machine learning could be utilized to extract the fundamental parameters of our Universe from a large galaxy survey. In another example, I will present a pipeline that estimates the baryonic (visible) properties of galaxies based only on their dark matter (invisible) content in a large dark matter-only simulation.

  Speaker: Ji-hoon Kim (Seoul National University)

4:00 PM → 6:00 PM — **Free Discussions** — 2h

6:00 PM → 8:00 PM — **Reception** — 2h

Let’s begin!