Summary

Wen-Chen Chang

2024/1/30

Recent Physics Results

- **PDFs**: Hutauruk, P.J. Lin, Goto, Son
- **GPDs**: Hatta, Hutauruk, Joo, P.J. Lin, Son
- **TMDs**: Seidl, Joo, P.J. Lin, Goto, D. Lin, Zhou
- **Small-x**: Xu, Yang, Zhou

ePIC (Lajoie)

EIC Detector Requirements

Radius/Distance from IP

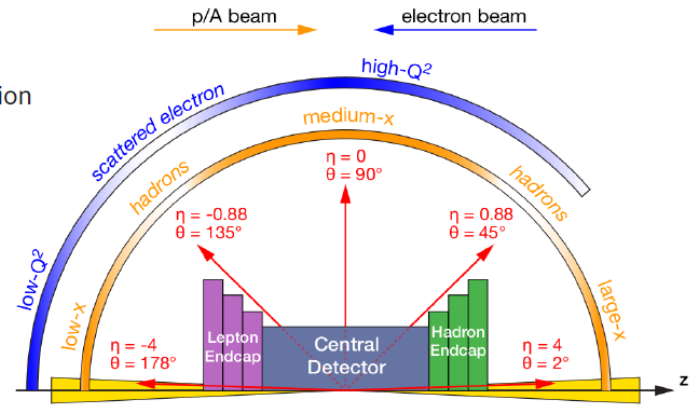
Vertex detector → Identify primary and secondary vertices,
- Low material budget: 0.05% X/X_0 per layer
- High spatial resolution: 20 μm pitch CMOS Monolithic Active Pixel Sensor

Central and Endcap tracker → High precision low mass tracking
- MAPS – tracking layers in combination with micro pattern gas detectors

Particle Identification → High performance single track PID for π, K, p separation
- RICH detectors (RICH, DIRC)
- Time-of-Flight high resolution timing detectors (HRPPDs, LGAD)
- Novel photon sensors: MCP-PMT / HRPPD

Electromagnetic calorimetry → Measure photons (E, angle), identify electrons
- $PbWO_4$ Crystals (backward), W/ScFi (forward)
- Barrel Imaging Calorimeter (Si + Pb/ScFi)

Hadron calorimetry → Measure charged hadrons, neutrons and K_L^0
- Achieve ~70%/√E + 10% for low E hadrons (~ 20 GeV)
- Fe/Sc sandwich with longitudinal segmentation



Very forward and backward detectors → Large acceptance for diffraction, tagging, neutrons from nuclear breakup
- Silicon tracking layers in lepton and hadron beam vacuum
- Zero-degree high resolution electromagnetic and hadronic calorimeters

DAQ & Readout Electronics → trigger-less / streaming DAQ, Integrate AI into DAQ

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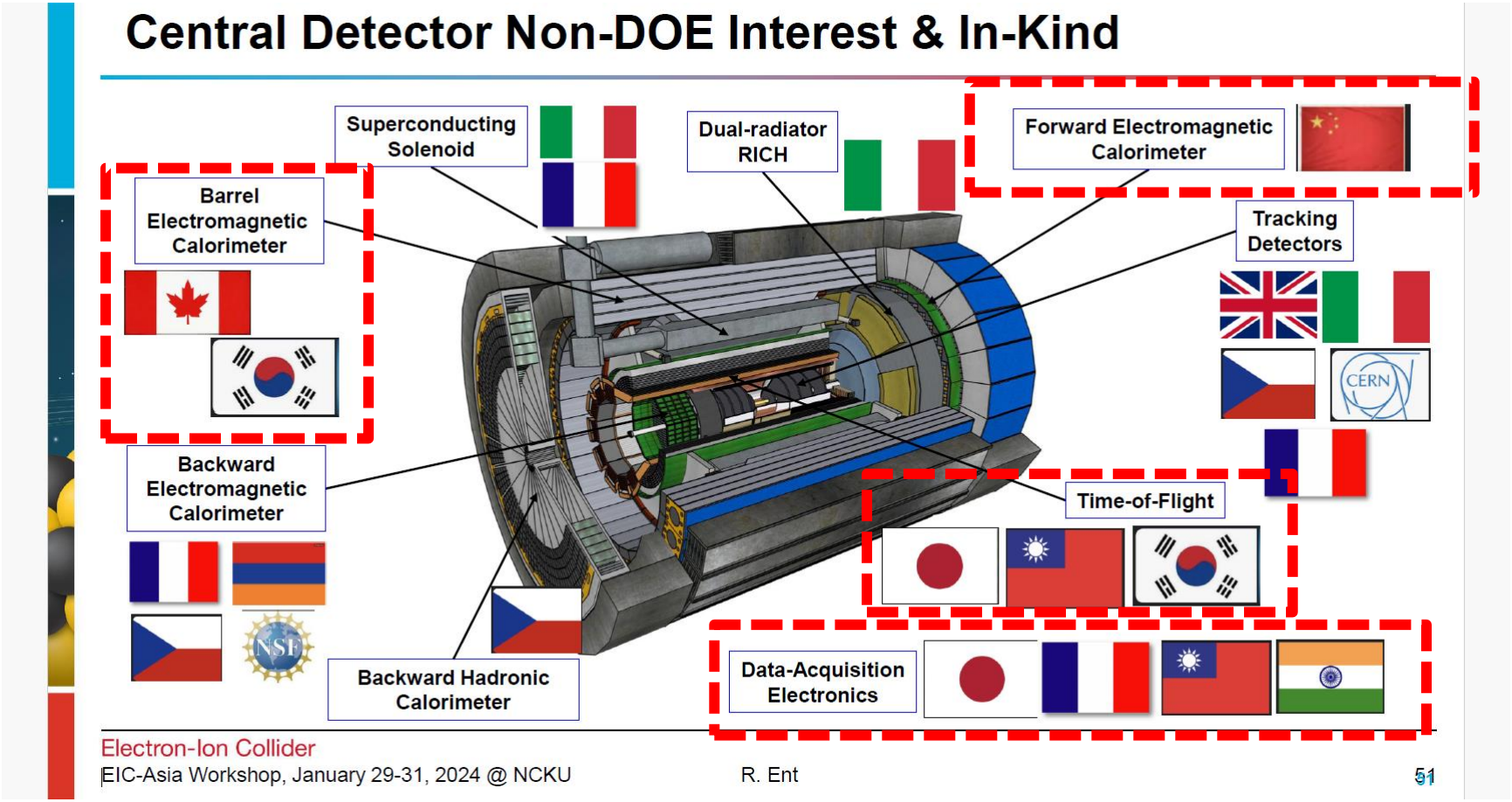
Central Detector Non-DOE Interest & In-Kind
Superconducting Solenoid
Dual-radiator RICH
Forward Electromagnetic Calorimeter
Barrel Electromagnetic Calorimeter
Tracking Detectors
Backward Electromagnetic Calorimeter
Time-of-Flight
Backward Hadronic Calorimeter
Data-Acquisition Electronics
CERN
NSF
Electron-Ion Collider
EIC-Asia Workshop, January 29-31, 2024 @ NCKU
R. Ent
51

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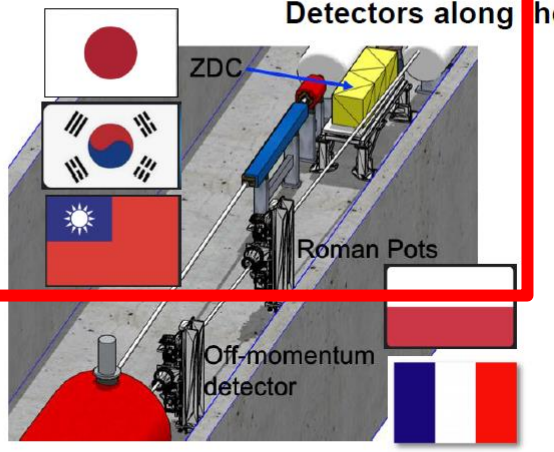
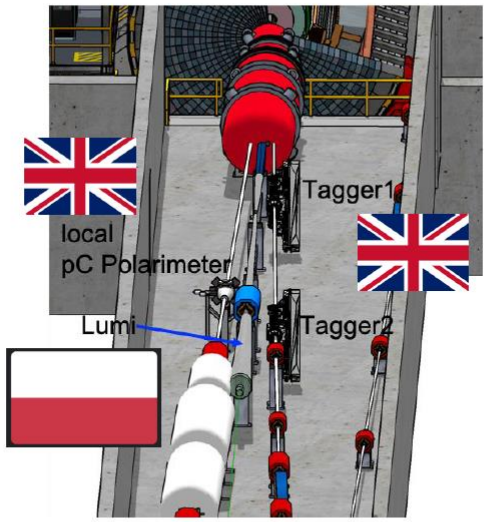
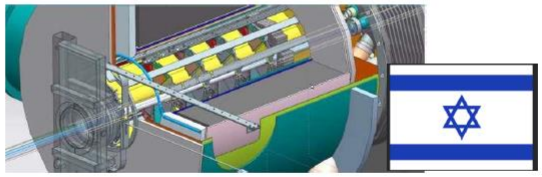
Far-Forward/Far-Backward Detectors Non-DOE Interest & In-kind

Detectors along the hadron and electron beam-lines





B0-Tracker & Electromagnetic Calorimeter



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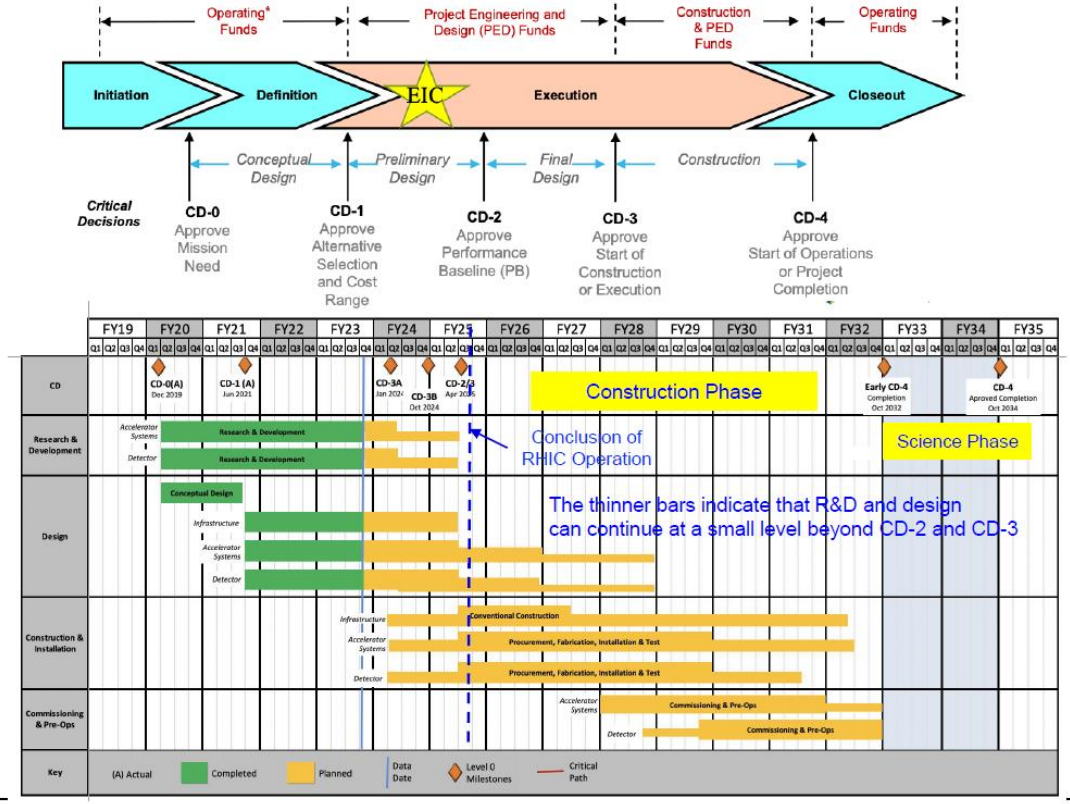
EIC Schedule

EIC Critical Decision Plan	
CD-0/Site Selection	December 2019 ✓
CD-1	June 2021 ✓
CD-3A	January 2024
CD-3B	**October 2024**
CD-2/3	**April 2025**
early CD-4	October 2032
CD-4	**October 2034**

CD-2:
Approve preliminary design for all subdetectors
Design Maturity: >60%
Need "pre-"TDR (or draft TDR)
Baseline project in scope, cost, schedule

CD-3:
Approve final design for all subdetectors
Design Maturity: ~90%
Need full TDR



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Experimental Program Progress Since CD-1

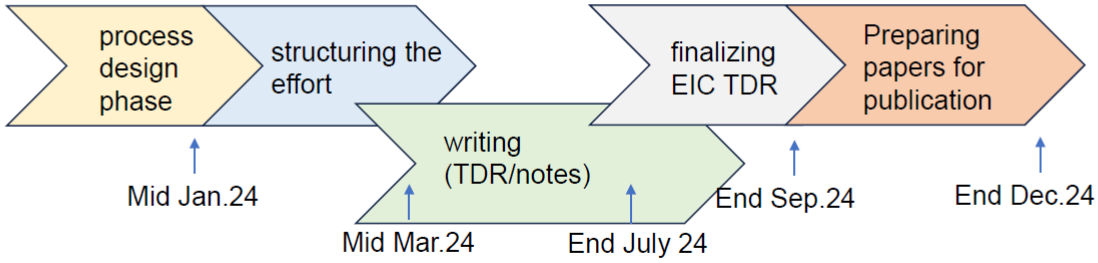
BNL and TJNAF Jointly Leading Efforts Towards Experimental Program		
2021	EIC Yellow Report (https://arxiv.org/abs/2103.05419)	February 2021
	Call for Collaboration Proposals for Detectors https://www.bnl.gov/eic/CFC.php	March 2021
	Collaboration Proposals for Detectors Submitted	December 2021
2022	Decision on Project Detector – "ECCE"	March 2022
	Process to consolidate ECCE & ATHENA to the EIC Project Detector ePIC	Spring 2022
	ePIC Collaboration Formed – 160 institutions	July 2022
2023	ePIC Charter ratified & elected Leadership Team	February 2023
	All subdetector technologies defined	April 2023

- EIC Project central detector fully defined by 04/2023
- Some final decisions to make for far-forward/far-backward detectors where scope is correlated with accelerator → design review 02/12/24

ePIC (Lajoie)

TDR Strategy and Publications

- In 2024 the ePIC collaboration will produce:
- The ePIC contributions to the EIC TDR
  - The EIC TDR is the top priority
    - Chapters on *Physics Goals and Requirements* and *Experimental Systems*
    - Not just the document, but the simulations and detector R&D that form the basis
    - Requires close cooperation between the collaboration and the project!
- An ePIC Detector Design paper:
  - Derived and expanded from the *Experimental Systems* TDR chapter
- An ePIC Physics Performance paper:
  - Derived and expanded from the *Physics Goals and Requirements* TDR chapter
- Both to be published in a scientific journal (such as NIMA, JINST, or PRC, etc.)
- These publications will serve as a focus in developing the ePIC Membership and Publication policies.



ePIC (Lajoie)

Upcoming Events…

- 3rd EIC-Asia Workshop in Taiwan Jan. 29-31, 2024
  - https://indico.phys.sinica.edu.tw/event/88/
- CERN Recognized Experiment - Feb 8th , 2024
- FFWD/FBKWD Preliminary Design Review
  - February 12, 2024
- DIS 2024 in Grenoble, France April 8-12th , 2024
  - https://lpsc-indico.in2p3.fr/event/3268/
- ePIC Software and Computing meeting @ CERN April 22nd-26th
  - https://indico.cern.ch/event/1343984/
- 4th EIC-Asia Workshop in Shanghai July 1-5, 2024
  - https://indico.cern.ch/event/1361239/
- Joint EICUG/ePIC Collaboration Meeting @ Lehigh University July 22nd-28th
  - https://indico.bnl.gov/event/20727/

The 1st EIC-Asia Workshop in Seoul

Asia/Seoul | English (United States) | Login

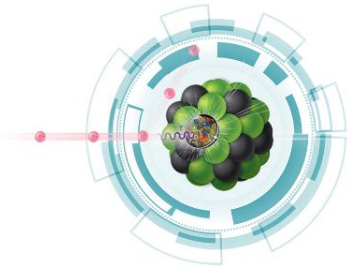
apctp asia pacific center for theoretical physics

APCTP Workshop on the Physics of Electron Ion Collider

Nov 2 – 4, 2022
Howard Johnson Incheon Airport Hotel
Asia/Seoul timezone

Enter your search term

- Overview
- Call for Abstracts
- Timetable
- Contribution List
- Registration
- Participant List
- Invited Speakers
- Venue/Directions
- Regarding COVID-19 & Visa (final update)



The Electron-Ion Collider (EIC), planned to be built at the U.S. Department of Energy's (DOE) Brookhaven National Laboratory (BNL), in partnership with Thomas Jefferson National Accelerator Facility (Jefferson Lab), will be the most advanced tool for studying some of the deepest unexplored recesses of the atom.

The EIC will be a particle accelerator that collides electrons with protons and nuclei to produce

https://indico.knu.ac.kr/event/592/

The 2nd EIC-Asia Workshop in Tokyo

EIC Asia Workshop

Mar 16, 2023, 7:00 AM → Mar 18, 2023, 1:30 PM Asia/Tokyo

Okochi-hall (Bldg C32) (RIKEN)

Ralf Seidl (RIKEN), Taku Gunji (Center for Nuclear Study, the University of Tokyo), Yuji Goto (RIKEN)

Description Venue: RIKEN Okochi hall, Building C32 in the RIKEN campus map.

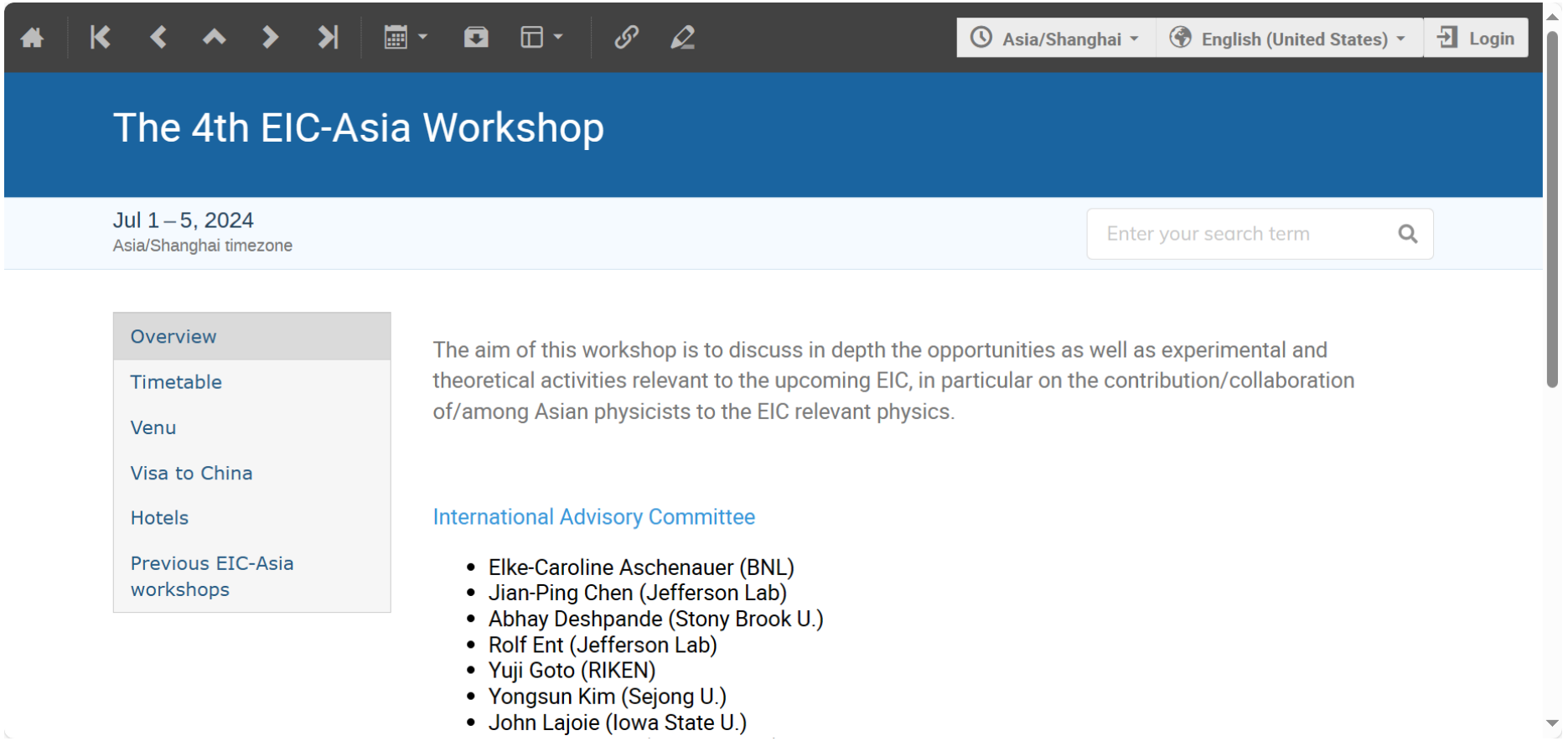
https://indico2.riken.jp/event/4389/


EPSON
JAN 29-31,2024
Asia
Workshop

Monthly Meeting
Among Asia EIC Colleagues

- eic-asia-l@ml.riken.jp
  - Japan: Yuji Goto <goto@bnl.gov>
  - Korea: Yongsun Kim <yongsun@sejong.ac.kr>
  - Taiwan: Chia-Ming Kuo <cmkuo@phy.ncu.edu.tw>
  - China:
  - India:

The 4th EIC-Asia Workshop in Shanghai



https://indico.cern.ch/event/1361239/