Some thoughts on Taiwan EIC team

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# Detector-1 collaboration

- EPIC is the clear favorite in the second round voting

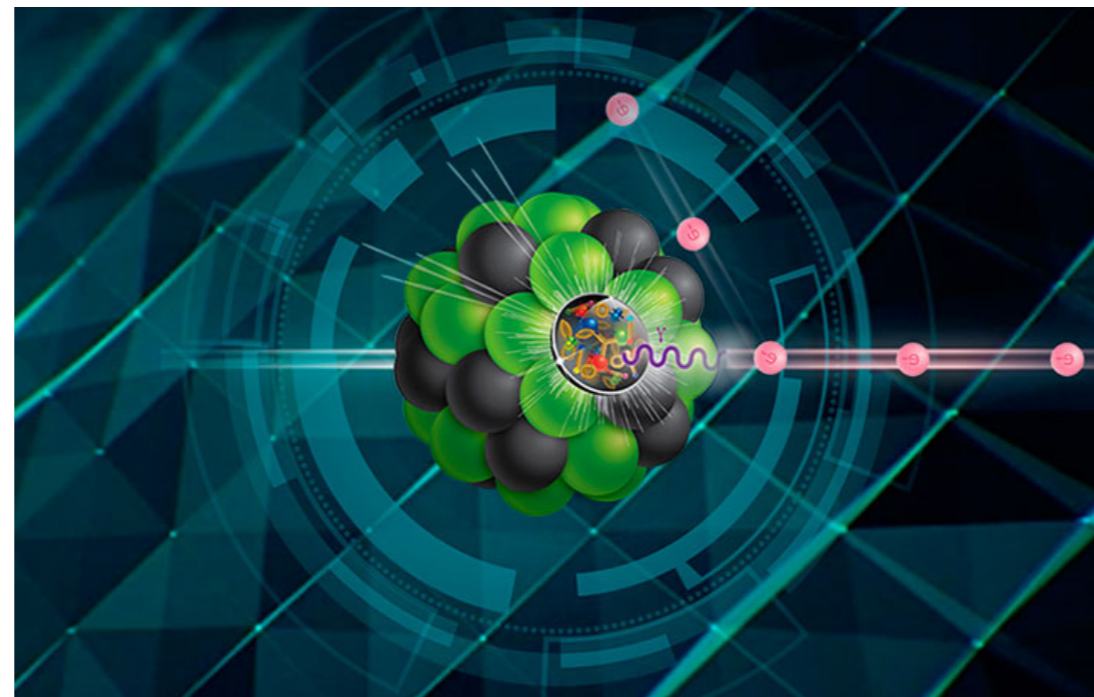| Name	First Round %	Second Round %
EPIC	21	42
ELECTRA	15	26
ELEIDA	12	18
D1	11	13

- Official name: EPIC

- Logo competition is on-going

EIC parameters

- High luminosity: L = $10^{33} - 10^{34} cm^{-2} s^{-1}$, 10-100/fb per year

- Highly polarized beams: 70%

- E_{cm} = 29 - 140 GeV

- Large ion species range: protons - Uranium

- User group: 1330 collaborators, 36 countries, 266 institutions
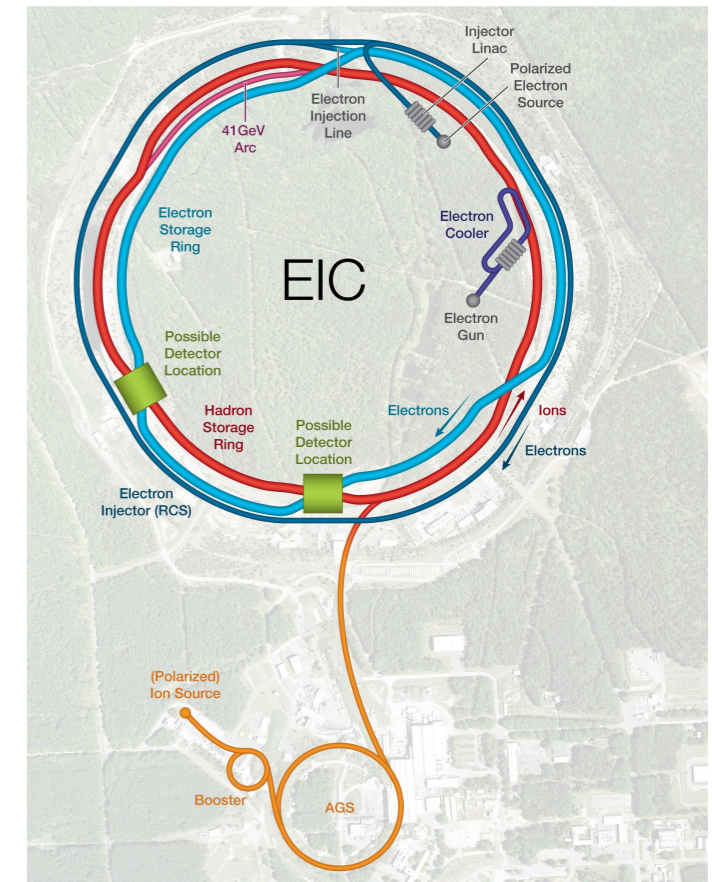
**p/A beam
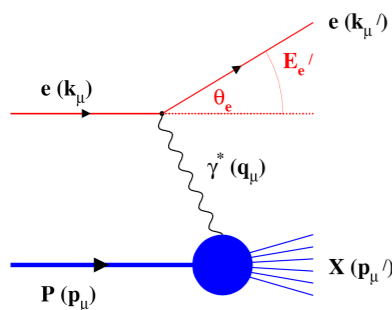(p: 41-275 GeV)**

**e beam
(5-18 GeV)**

EIC Physics

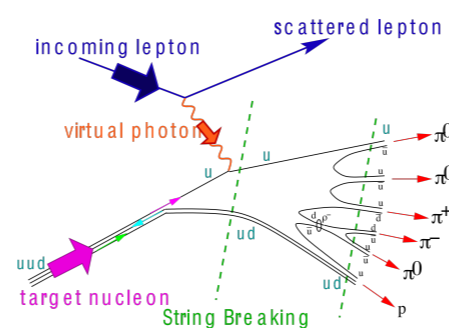**Parton Distributions in nucleons and nuclei**

inclusive DIS
- measure scattered lepton
- multi-dimensional binning: x, Q²
  - → reach to lowest x, Q² impacts Interaction Region design

$\int Ldt$: 1 fb⁻¹

Spin and Flavor structure of nucleons and nuclei / **Tomography Transverse Momentum Dist.**
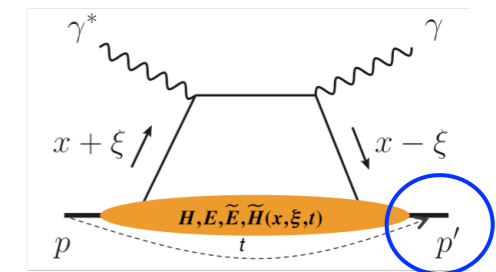
semi-inclusive DIS
- measure scattered lepton and hadrons in coincidence
- multi-dimensional binning: x, Q², z, p_T, Θ
 - → particle identification over entire region is critical

10 fb⁻¹

QCD at Extreme Parton Densities - Saturation / **Tomography Spatial Imaging**

exclusive processes
- measure all particles in event
- multi-dimensional binning: x, Q², t, Θ
- proton p_t: 0.2 - 1.3 GeV
  - → cannot be detected in main detector
  - → strong impact on Interaction Region design

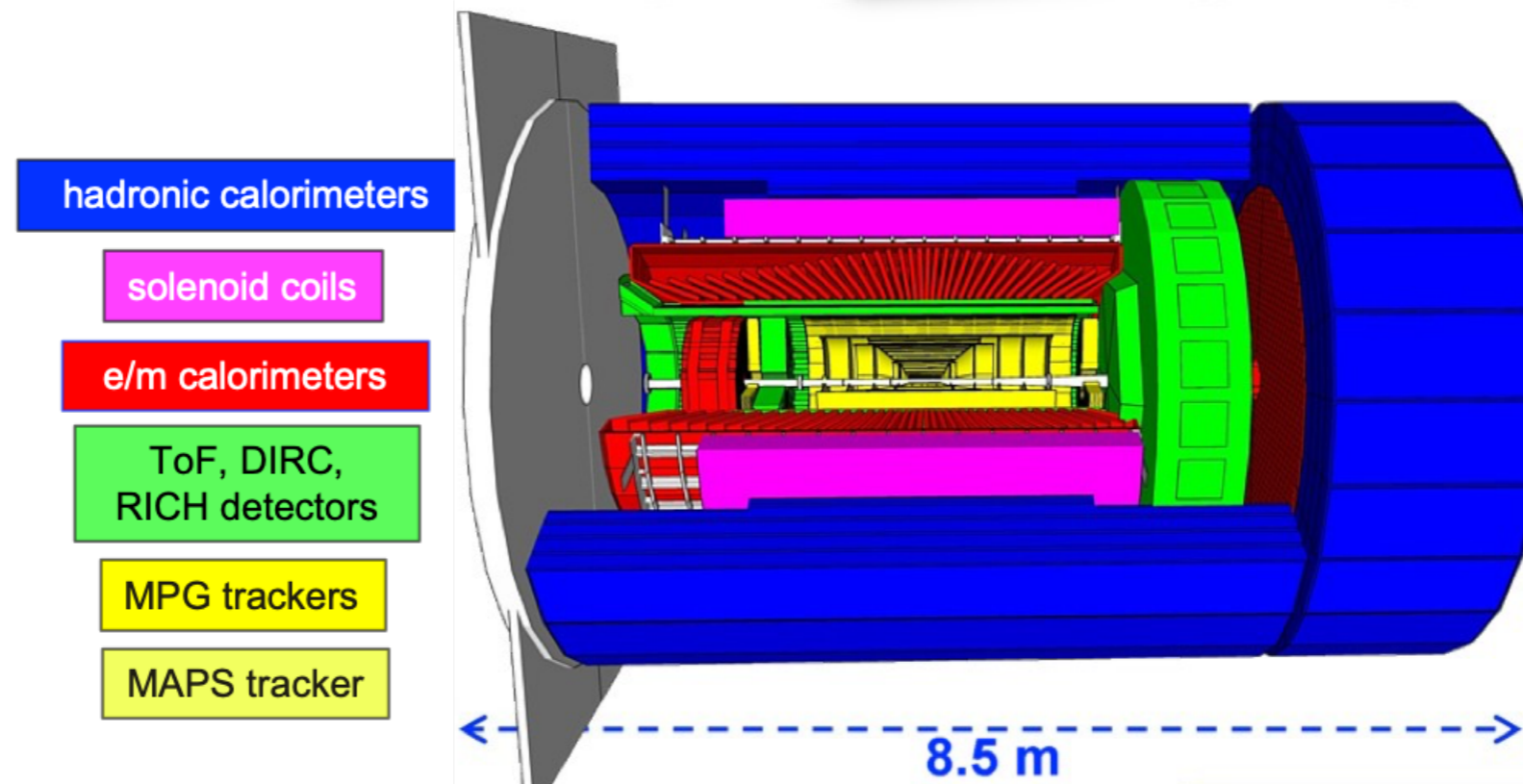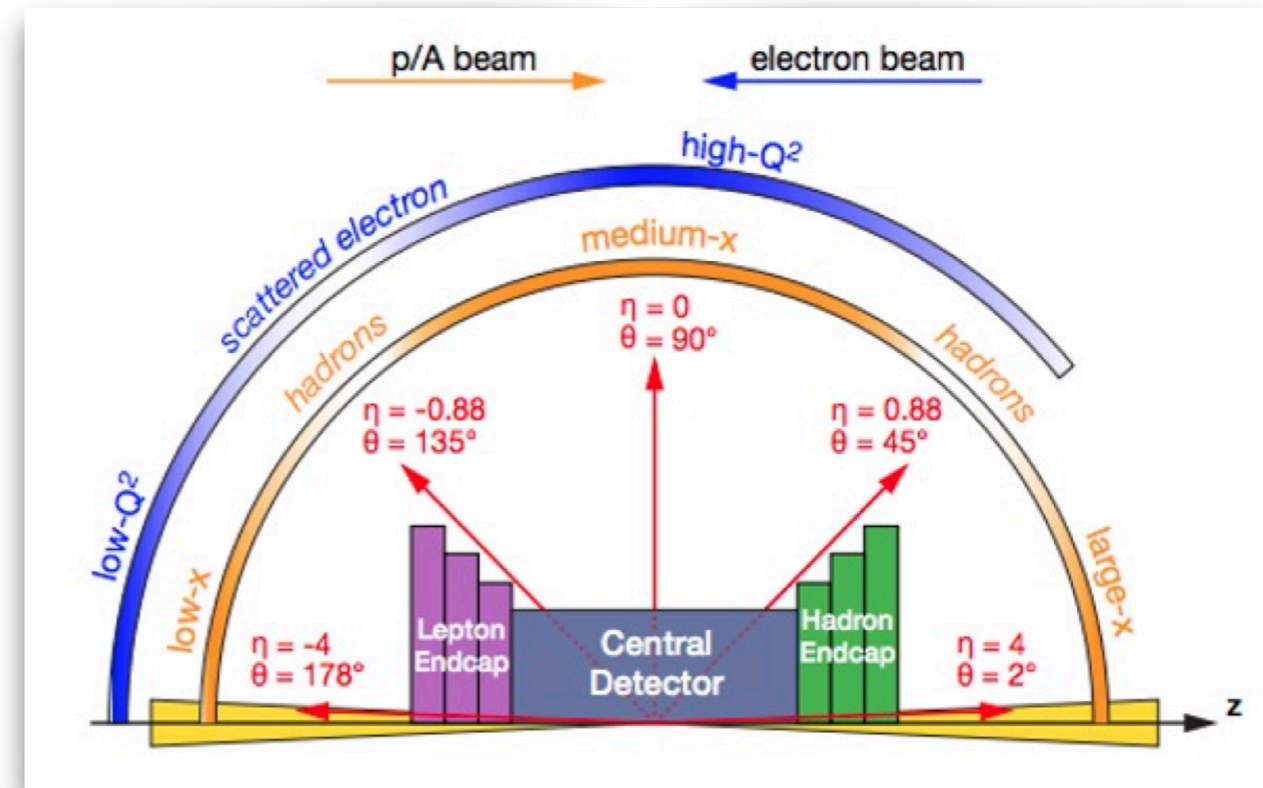10 - 100 fb⁻¹

machine & detector requirements
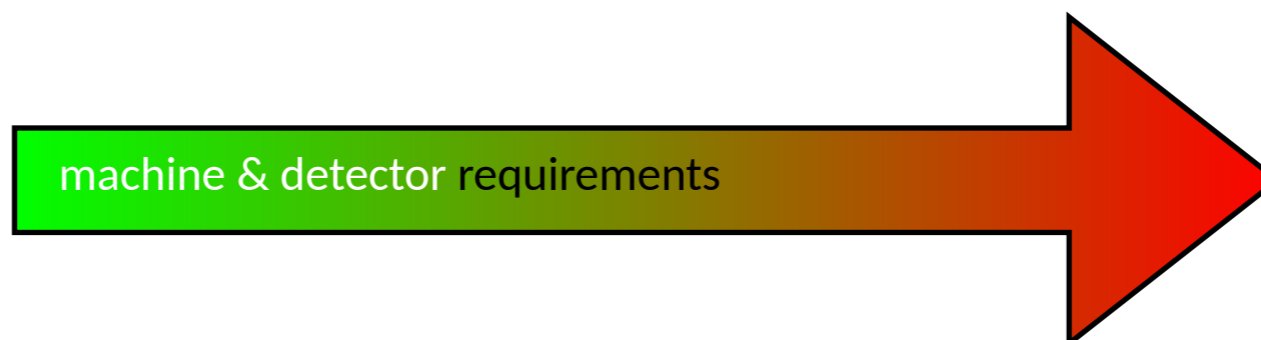
slide from EICUG meeting

EPIC Detector

- Low multiplicity per event: < 10 tracks

- Interaction rate: 500kHz → no significant PU from collisions

- Radiation is ~100x less than LHC

Detector: Korean model for EIC

Group A (Forward Cal)	R&D of forward calorimeters, including neutron detectors at the very forward region.
Group B (Pixel Tracker)	Development, test, and production of silicon pixel detector
Group C (Dual-Readout)	single component calorimeter technique including entire functionalities of both electromagnetic and hadronic calorimeters

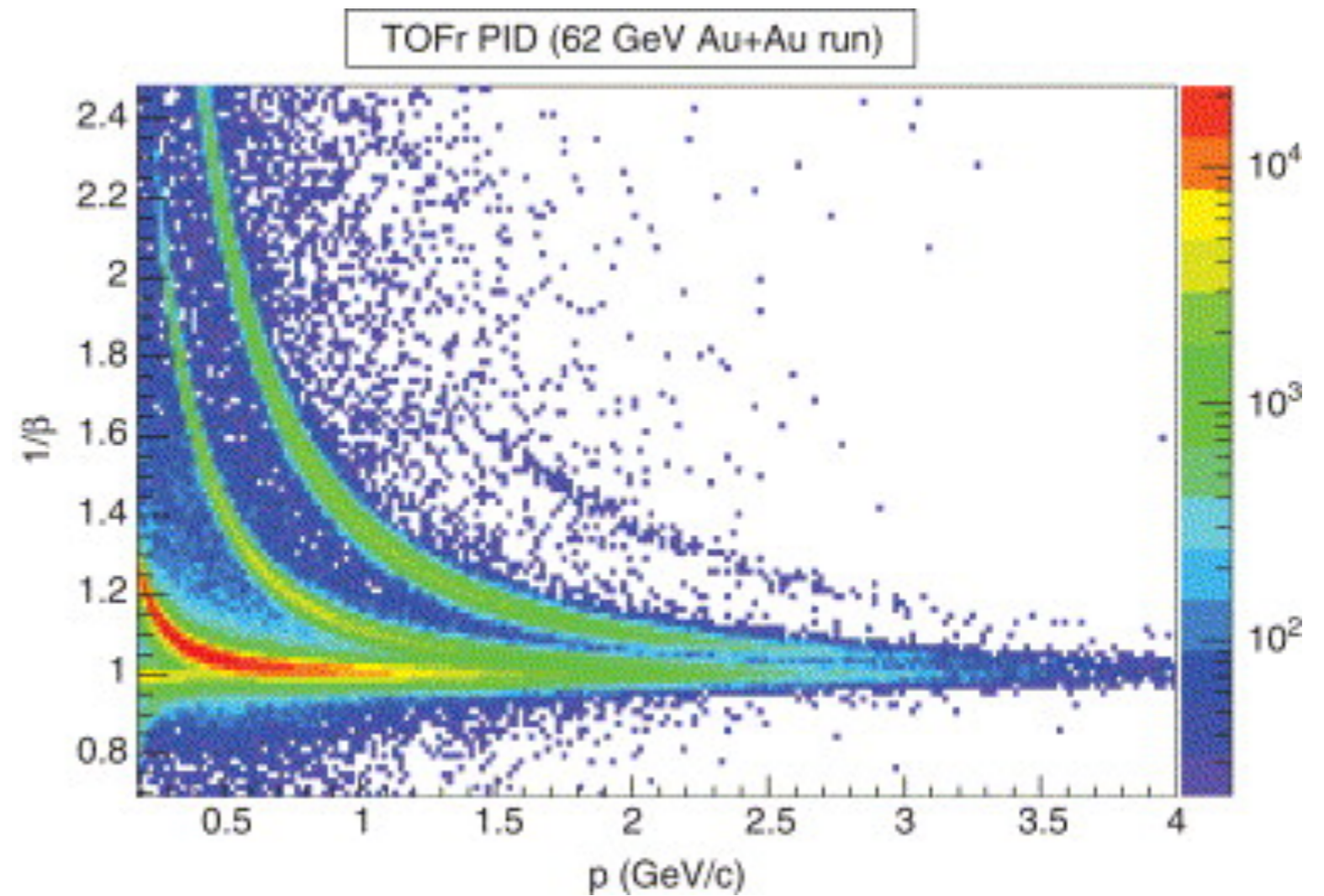- Group A (Forward) is inspired by the physics interest of the heavy ion groups involved in CMS, PHENIX and RHICf

- Group C(DRC) is dedicated to the R&D of dual-readout calorimeters for generic use

Detector

- LGAD

  - RH, CH, KY, JY, SM, Willis, Vicent, CM, …

  - TSRI, OptoTech

- ASIC ?

- Detector assembly: RS

- PCB production with Plotech

- R&D fund ?

Physics objects

- PID

Computing

- ASGC

Physics topics

- Roadmap we had at CMS

  - Decide which detector to work on → Preshower → ECAL

  - Focus on the physics objects associated with the detector → e/γ

  - Work on the physics with e/γ in the final state

- At sPHENIX, we may work on the heavy flavor physics (under discussion)

- At EIC

  - Heavy flavor physics allows us to study

    - initial nuclear parton distribution functions (nPDFs) → in sync with we did in p+Pb in CMS

    - parton energy loss

  - CGC related measurements

International reputation

- Apart from active participations to the collaboration, it would be good if we can host some international conferences in Taiwan

- Have been trying hard to bid for HP2024, IS2023, QM2025

  - received strong support from domestic community, MIT and RIKEN

  - no success so far; will keep trying

- DIS and EICUG meeting can be the option as well

Next Next Quark Matter
Taipei Proposal

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**MIT, USA**

Bring EIC/EPIC to Taiwan

- There have been discussions with ECCE management, sPHENIX management and the Japanese/Korean/Chinese colleagues to host a sPHENIX/ EIC/EPIC sandwich meeting in Taiwan 😀

- Despite agreeing to host in Taiwan, it is in a state of uncertainty due to Taiwan's 3+4 quarantine ☹️

有望出國了！總統蔡英文今（19）日表示，今年以來，入出境旅客逐步成長，現在正是時候，爭取國際旅客來台做準備，並相信「觀光產業的黎明曙光」快要來到。她強調，在兼顧經濟、防疫下，她已經請行政院「仔細評估開放邊境時程表」，同時做好配套措施，適時開放觀光客入境。

蔡英文今在2022台北國際觀光博覽會開幕典禮致詞表示，面對全球疫情起起伏伏，觀光業者真的很辛苦，也很努力撐住產業，謝謝大家團結配合，為防疫盡一份力。

Manpower: students

- Low birth rate started hitting us (physical society)

- Students are summoned to EE and CS
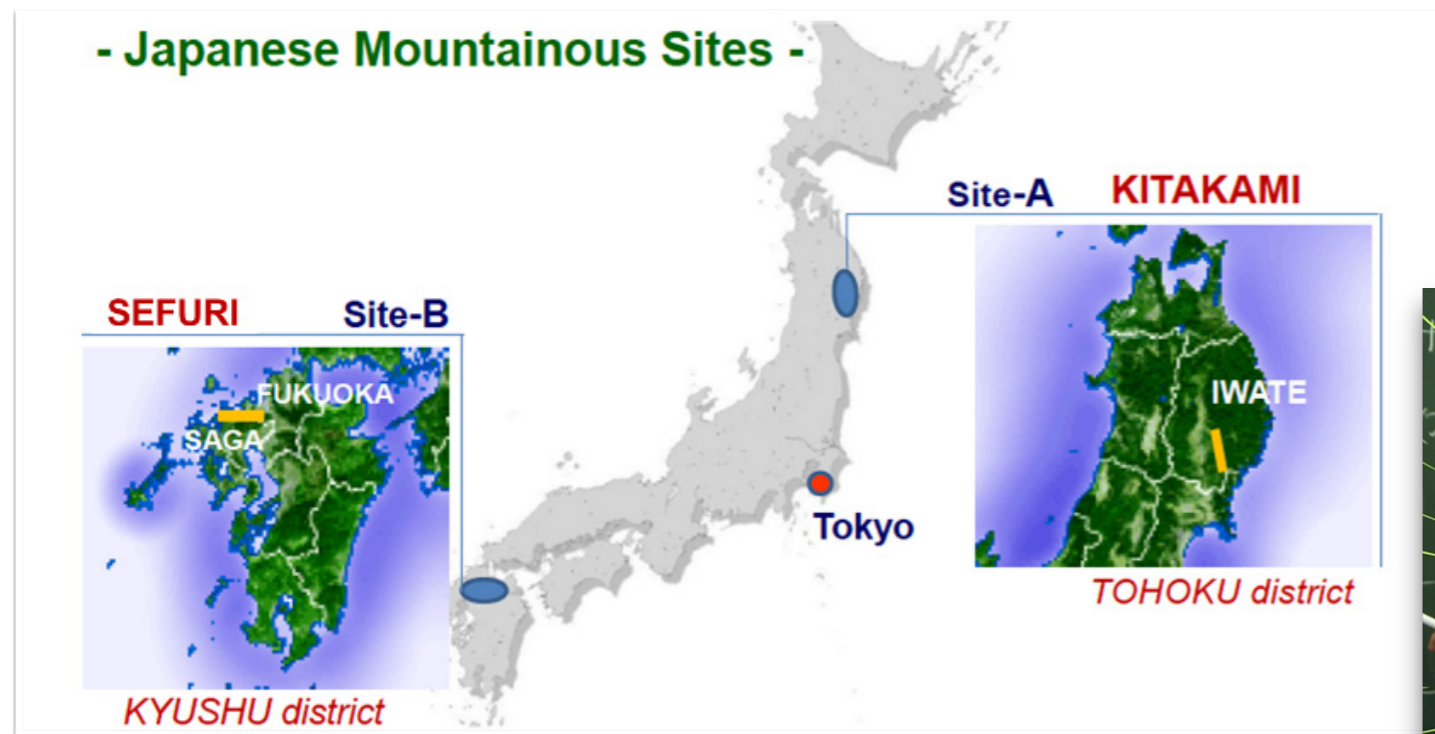
Manpower: theoretical colleagues

- Belle was a good model

  - a strong experimental team + several outstanding theorists

- LHC has been also a good model

  - four experimental teams + several outstanding theorists

- PHOBOS was a bad model

  - a very very very small team + no theorists

Summary

- There are many detector and physics opportunities on the market

- However, we have limited resources

- It is better to form a strong community in Taiwan to participate in EIC