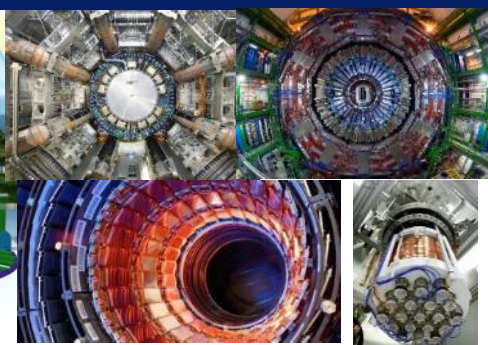
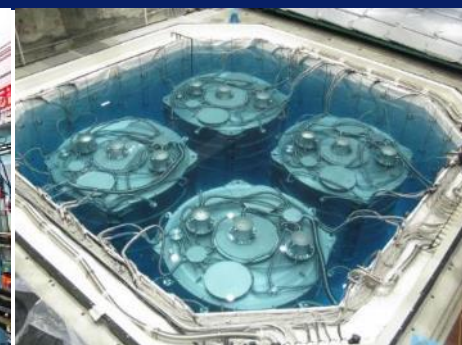


Introduction to Experimental Physics Division

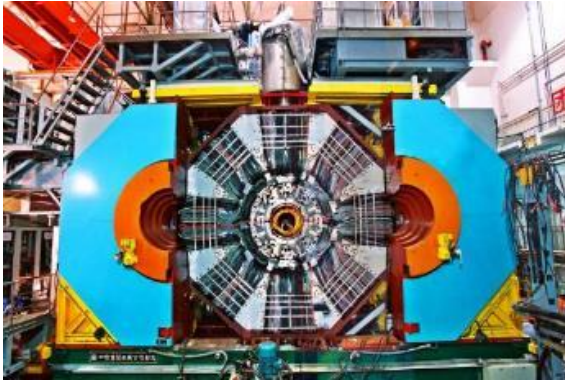
Liangjian Wen

Institute of High Energy Physics, CAS

Jan. 21, 2025 @ CAREER INFORMATION SESSION OF IHEP CAS 2025

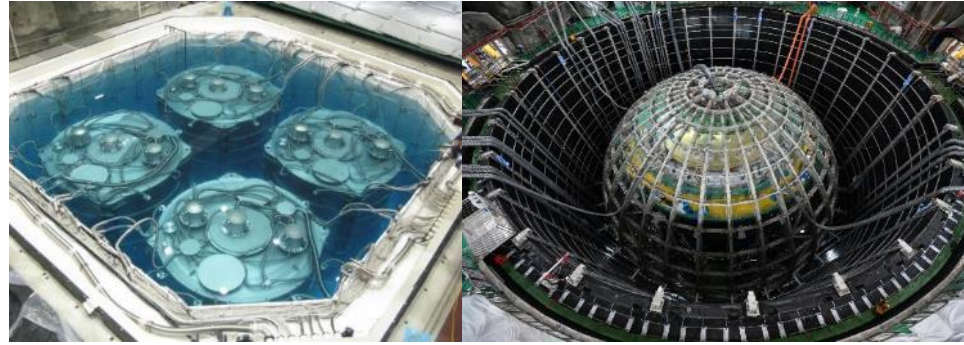


Experimental Physics Division (EPD)



Charm Physics

BESIII, BelleII, PANDA, GlueX



Neutrino Physics

Daya Bay, JUNO, EXO, DarkSide, COMET



High Energy Frontier

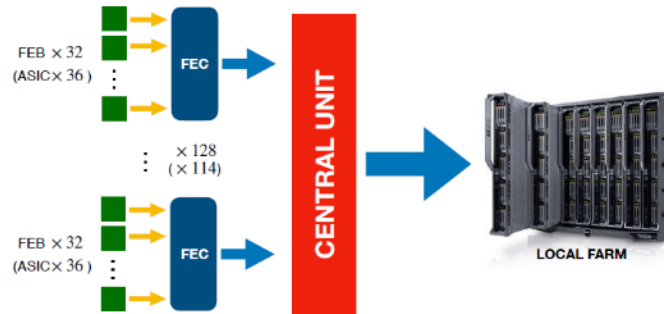
CEPC, LHC (ATLAS/CMS/LHCb)



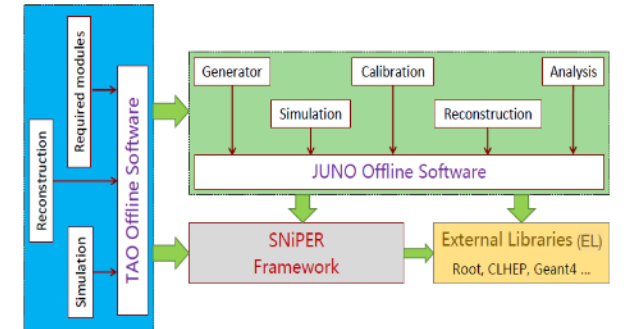
Detector



Electronics



Trigger, DAQ, DCS

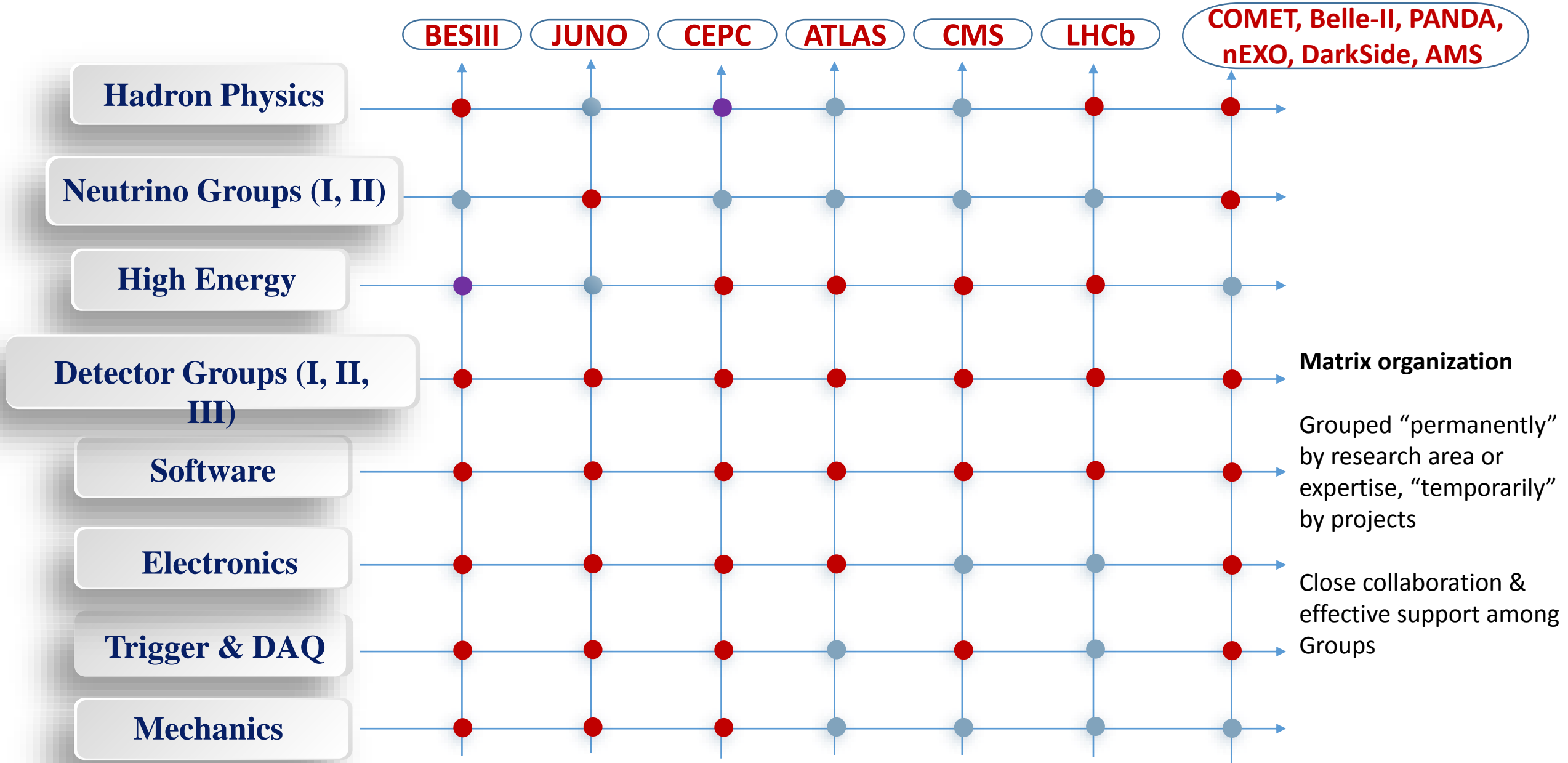


Software

Complete chain of design, construction, and operation of large-scale experiments, R&D of advanced technology
178 staff, 443 temporary (including postdoc, students), totaled 621 people (Dec. 2024)

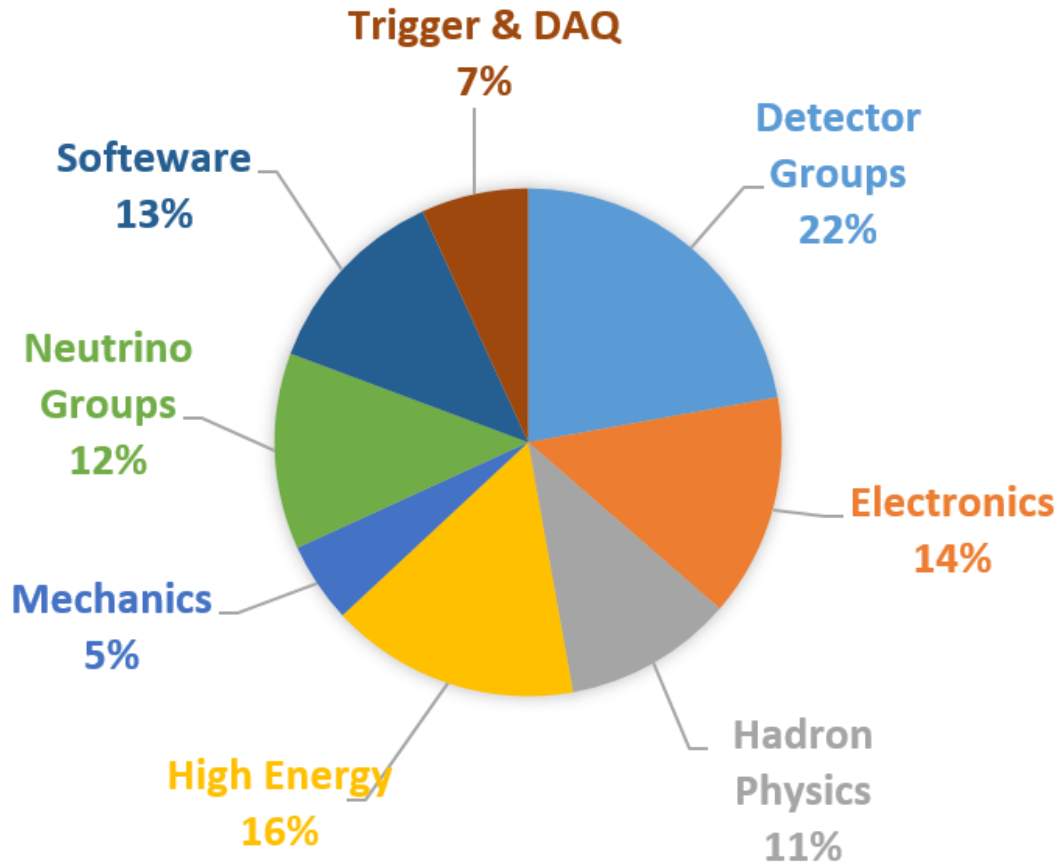


Research Groups in EPD





Members in EPD



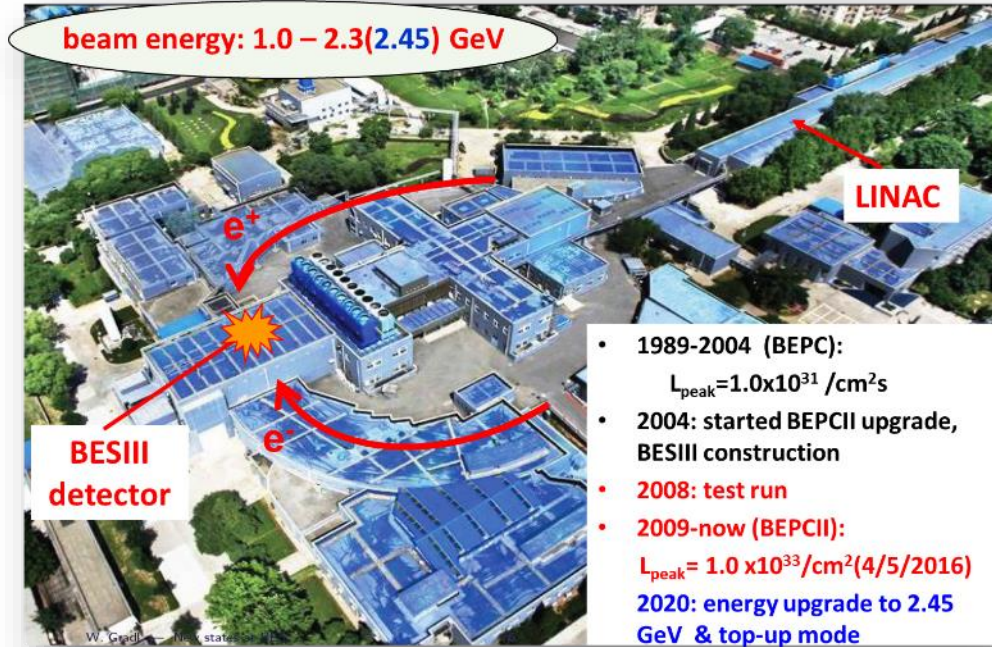
	Number
Faculty	~ 180 (5 international Prof.)
Postdoc	58 (15 international)
Student	~ 171
Visiting student	~ 163

Planned recruitment:

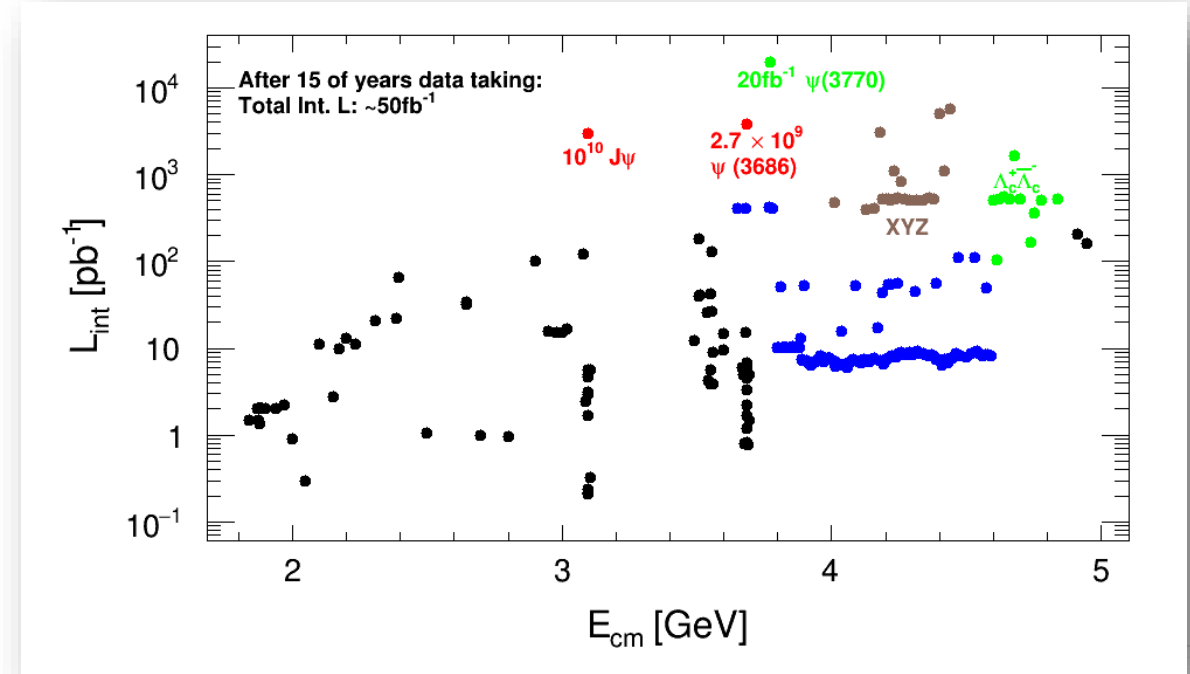
- Faculty: 5 ~ 10 /yr
- Postdoc: 50 – 60 /yr

Hadron Physics - BESIII

Beijing Electron Positron Collider (BEPCII)



World's largest τ – charm data sets in e^+e^- annihilation

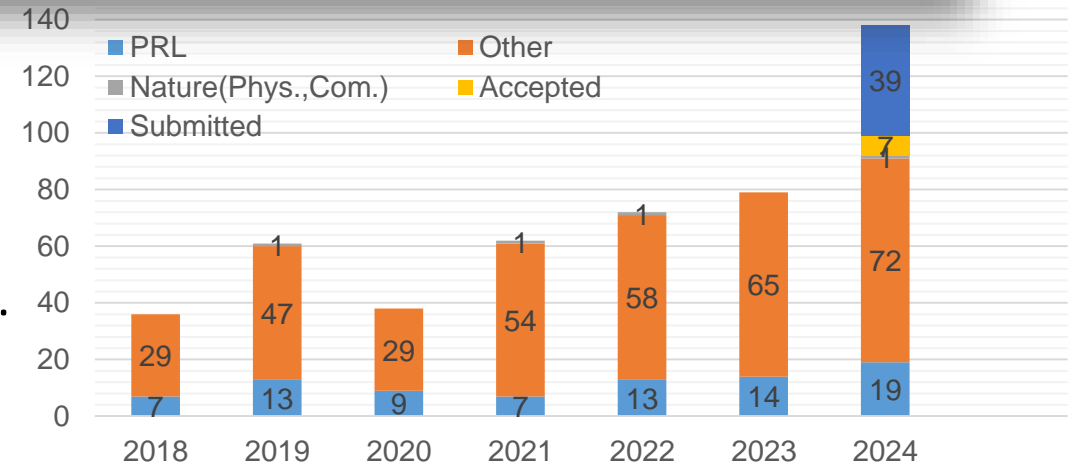


~ 600 members (more than 130 from outside of China)
from 84 institutions in 17 countries

Rich physics programs:

- Hadron spectroscopy, QCD exotics: **glueballs**, hybrids, XYZ's, ...
- **Charm flavor physics**: CKM matrix, decays constants, ...
- **Precision measurements**: R-values, time-like form factors, ...

BEPCII-U: 3x upgrade on luminosity; $E_{\text{cms}} \rightarrow 5.6 \text{ GeV}$ (2025)

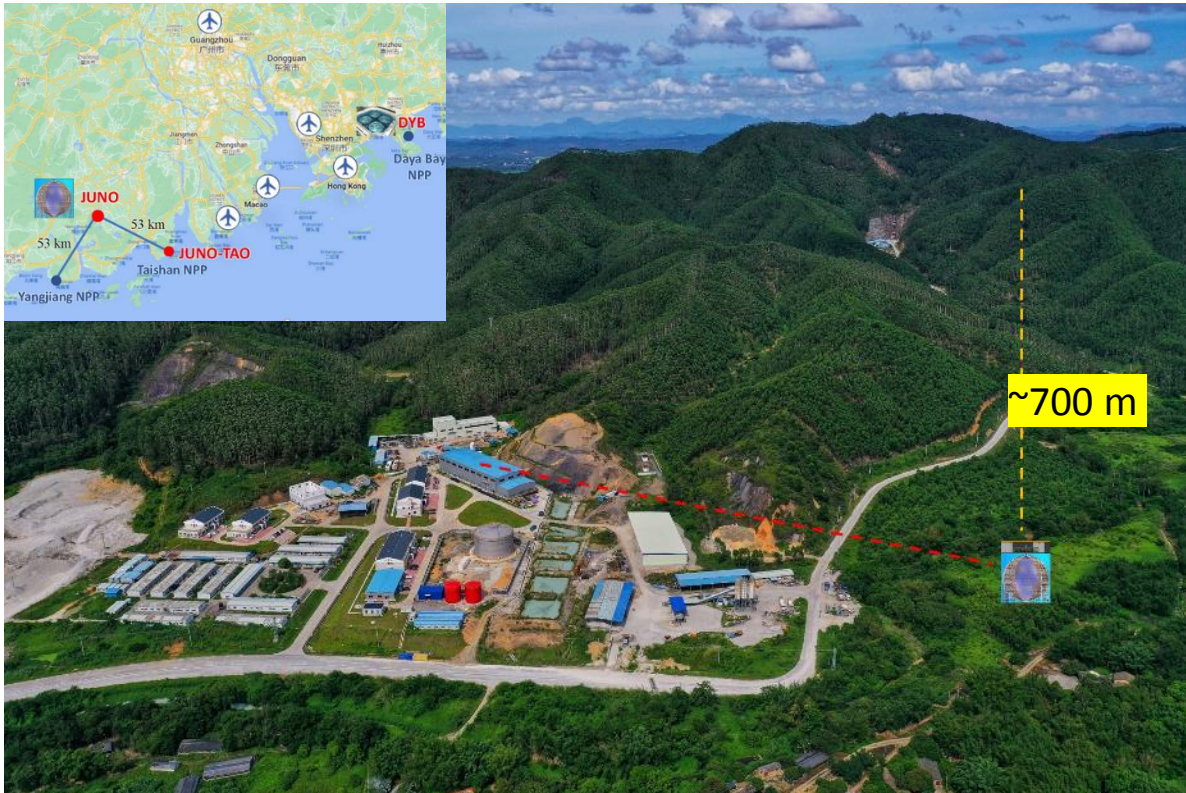


Neutrino Physics - JUNO

A multi-purpose neutrino observatory

- Determine **neutrino mass ordering** ($\sim 4\sigma$)
- **Precision measurement** ν -oscillation parameters ($\ll 1\%$)
- Other rich physics: **Supernova ν** , Geo- ν , Solar ν , Nucleon decay, Exotic searches, ...

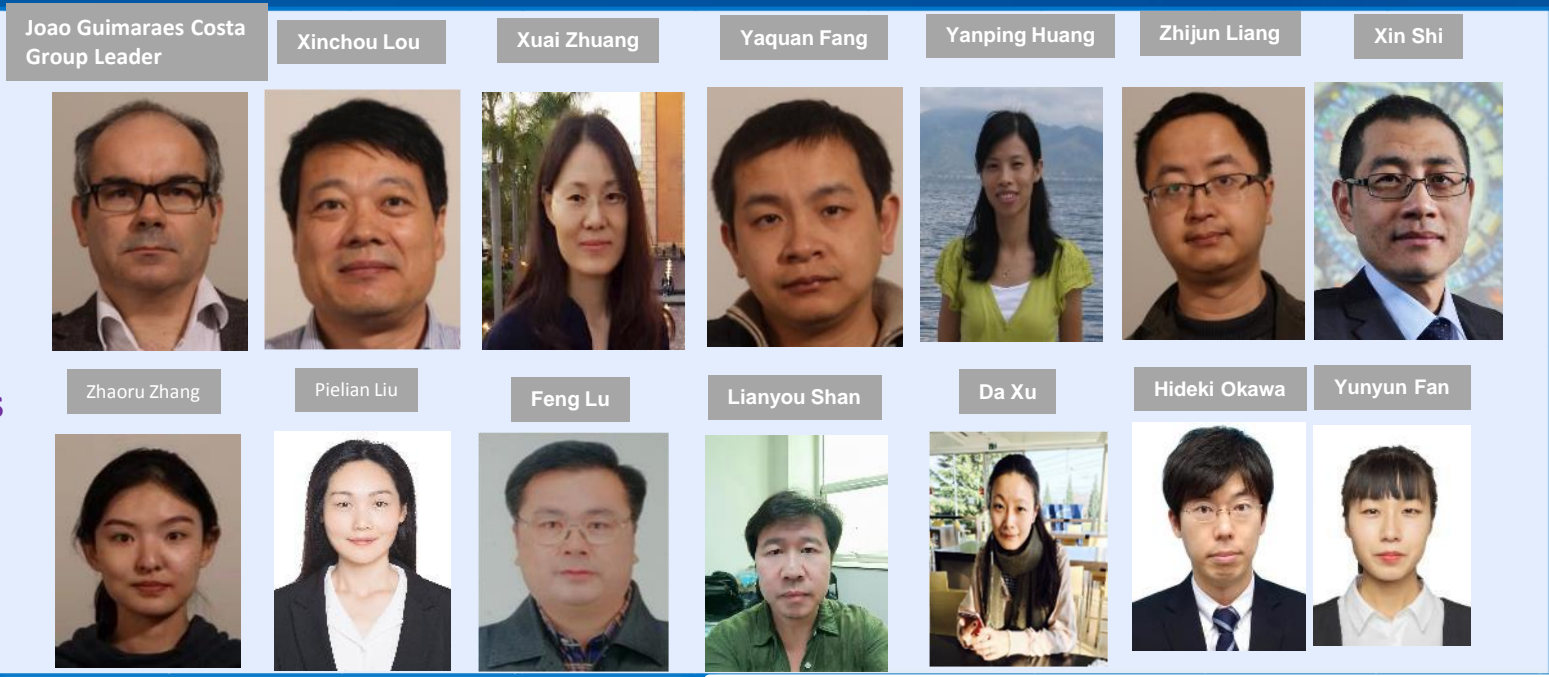
- Civil construction completed.
 - Installation work has started in Dec. 2021
 - Liquid filling started on 2024.12.18
 - Physics data taking in summer 2025
- Exciting results will come in next a few years!**
- By 2030s, upgrade to search for $0\nu\beta\beta$



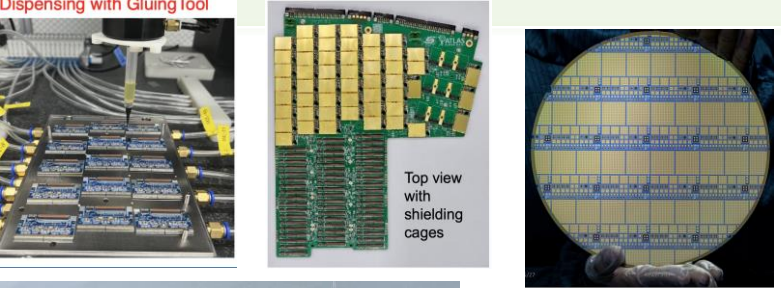
High Energy Frontier - ATLAS

- 14 Staff (3 international)
- 30 postdocs + Ph.D. students
- Topics :

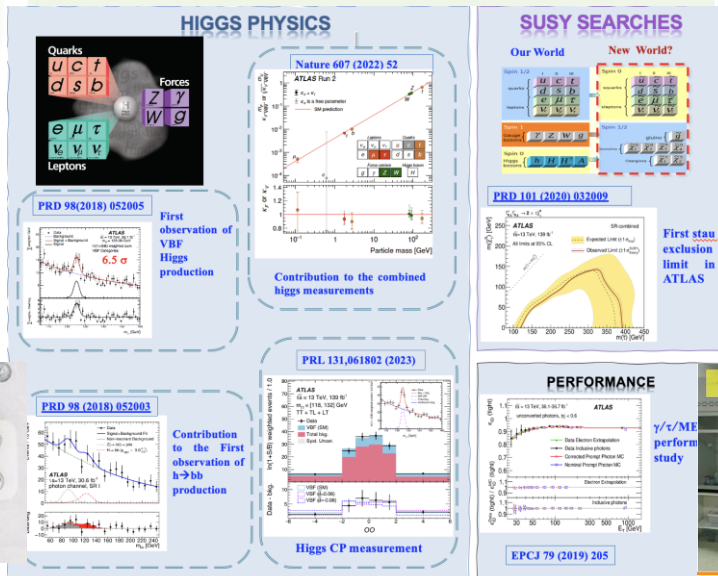
- ✓ High granularity time detector (HGTD)
 - ✓ LGAD sensors chosen by CERN
 - ✓ IHEP played a leading role in HGTD
 - ✓ Project leaders, L2/L3 conveners
- ✓ Upgrade of Inner Track (ITK)
- ✓ Physics with rich directions:
 - SM: Higgs, Di-Higgs, W mass
 - New Physics: SUSY, Higgs-related BSM



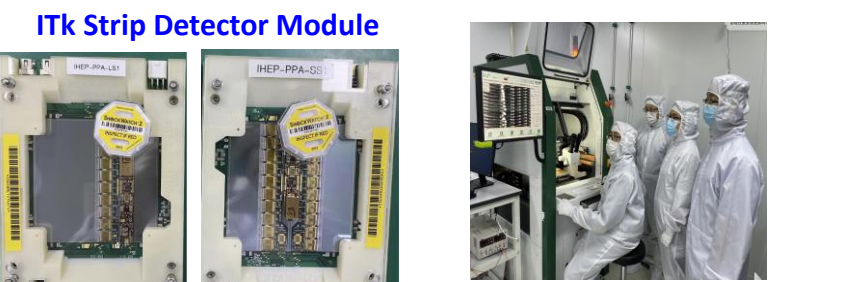
HGTD detector : IHEP plays a leading role



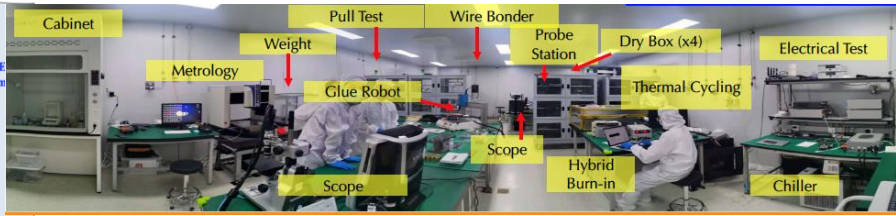
Physics highlights



ITK: Responsible for 10% barrel strip module



Clean room in IHEP



High Energy Frontier - CMS

- **IHEP CMS group:** 10 staff, 30+ postdocs and PhD students
- **Strong involvement in a broad physics program**
 - Higgs, new physics searches, Top and EW precision measurements
 - Detector performance and physic object studies
- **Well-established labs and heavy commitment in the upgrade projects**
 - CMS **High Granularity Calorimeter** (HGCAL) module assembly center
 - CMS **iRPC/RPC endcap backend electronics** and trigger system R&D
 - Participation in HGCAL beam and system tests, CSC GIF++ at CERN



High Energy Frontier - LHCb

All faculty members joined IHEP in the past 6 years

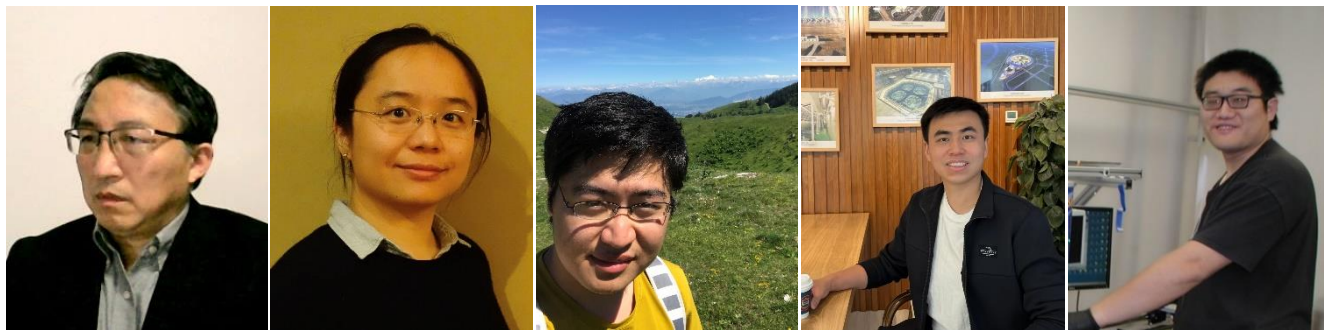
Jianchun Wang

Yiming Li

Shanzhen Chen

Zijun Xu

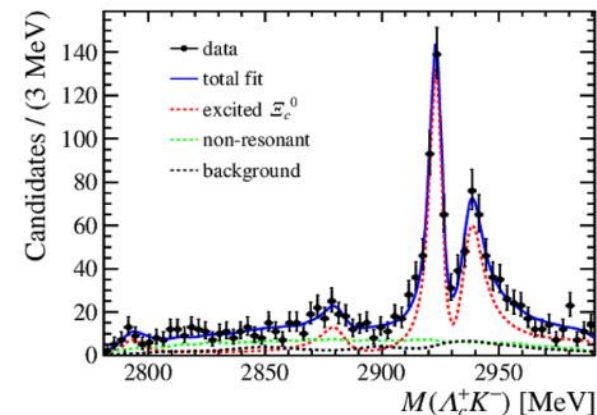
Xuhao Yuan



5 professors, 1 electronics engineer, 2 computing engineer, 2 visiting scientists
2 post-doctoral researchers, 14 post-graduate students

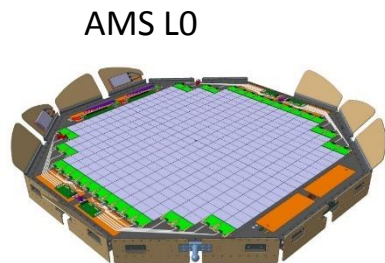
Heavy flavor physics

- Hadron spectroscopy and new particle searches
- CP violation and CKM parameter studies

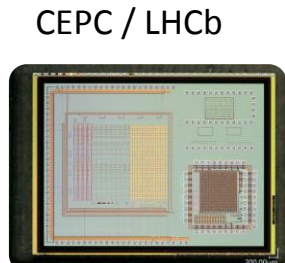


High-precision, radiation-hard silicon detector

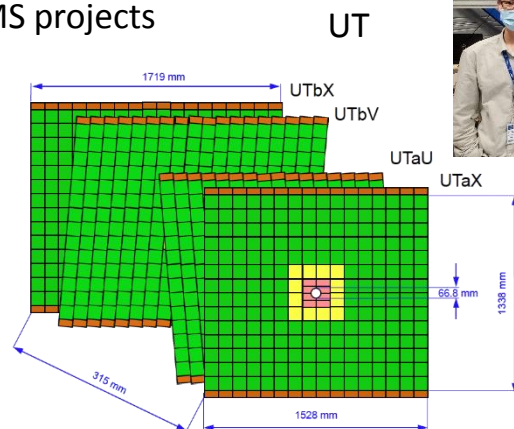
- LHCb Upstream Tracker (UT) installation & operation
- Silicon pixel detector R&D for LHCb upgrade and CEPC
- Silicon detector module assembly for AMS projects



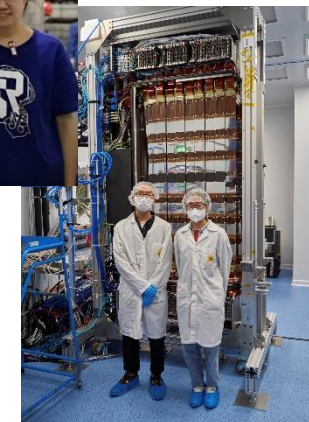
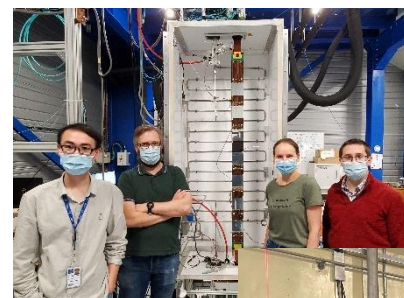
AMS LO



CEPC / LHCb



UT



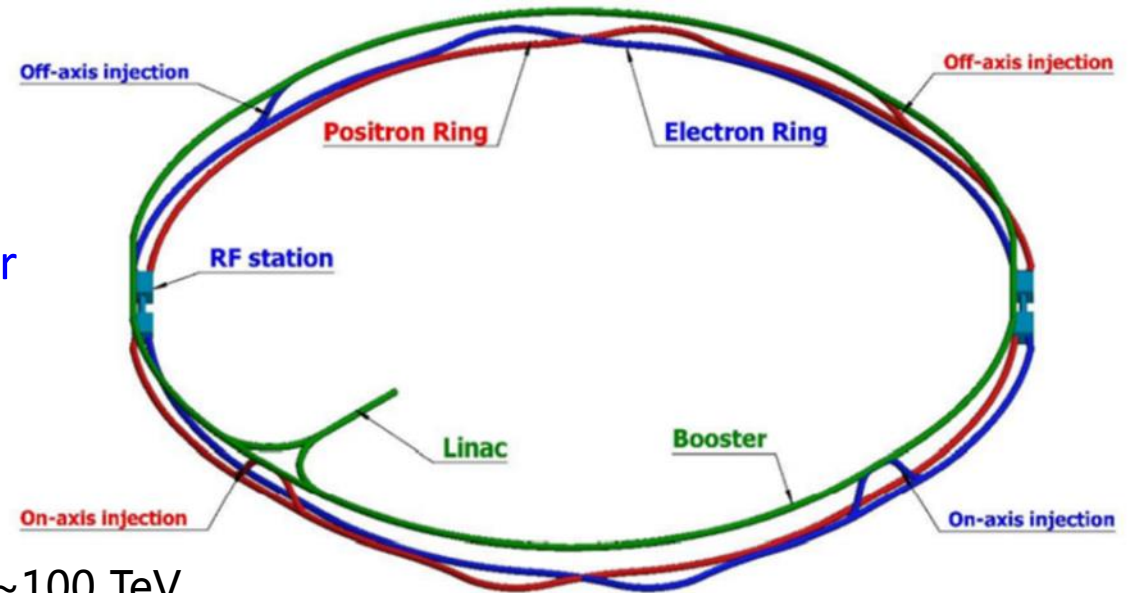
High Energy Frontier - CEPC

10

- CEPC: an e^+e^- Higgs factory producing H and W/ Z bosons and top quarks aims at discovering new physics beyond the Standard Model with energy scale of 10 TeV or even higher. Propose to commence construction in ~ 2027 and deliver data in 2030s
 - CEPC + SppC complex proposed in 2012 right after the Higgs discovery
 - Conceptual Design Report delivered in Nov. 2018, 1st for circular e^+e^- Higgs factory
 - R&D \sim ready, accelerator TDR released at Dec.2023, high-impact innovations

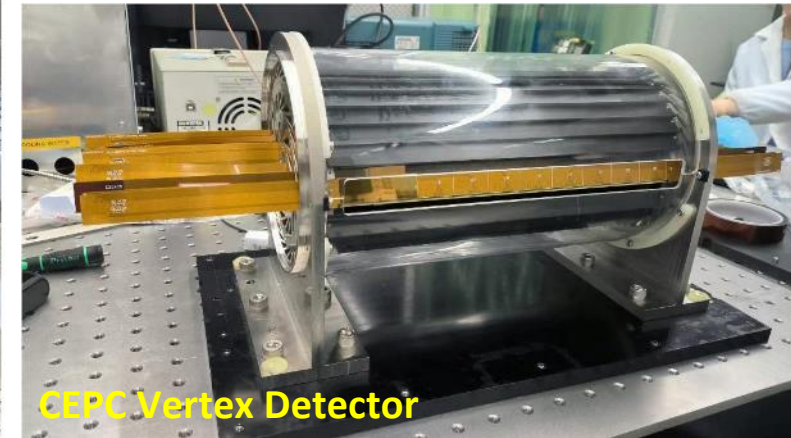
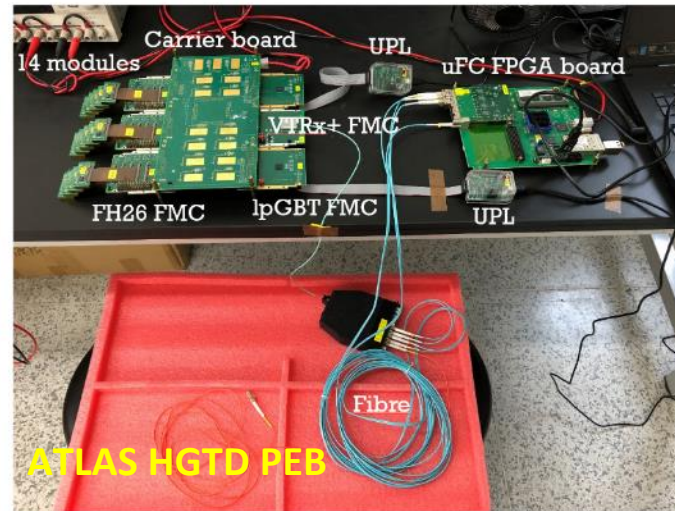
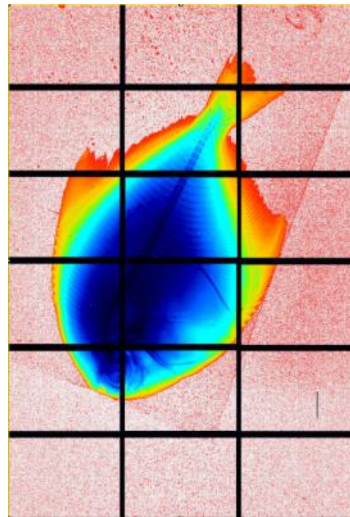
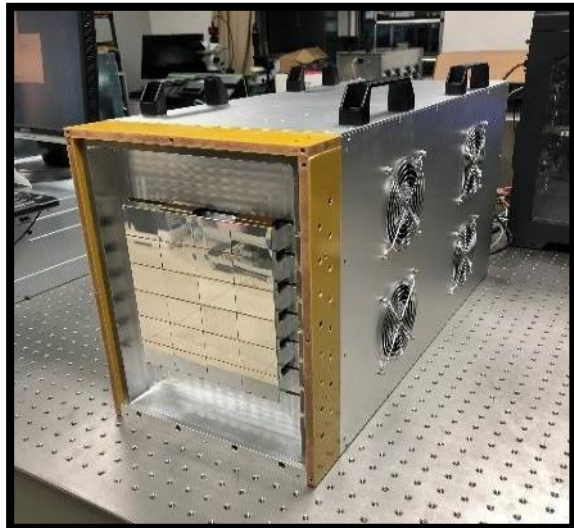
- Focuses in near future:

- Accelerator Engineering Design Studies
 - Physics studies, especially Physics White Papers
 - Detector: TDR study towards a reference detector
-
- **100 km circumference**
 - Energy 90-240 GeV, can be upgraded to 360 GeV
 - Updated to a Proton collider SppC in the same tunnel : ~ 100 TeV



Advanced Electronics development

- **EPD electronics group:** 23 staff, 15+ PhD students
- **Three major research directions**
 - Application Specific Integrated-Circuit (ASIC)
 - Advanced backend electronics system design
 - Advanced electronics technologies (packaging, cooling, communication...)
- **Long history and full chain of design capabilities for the electronics systems in large particle experiments**
 - BESIII, Dayabay, JUNO, LHAASO...
 - One of the largest electronics groups in the HEP field in China



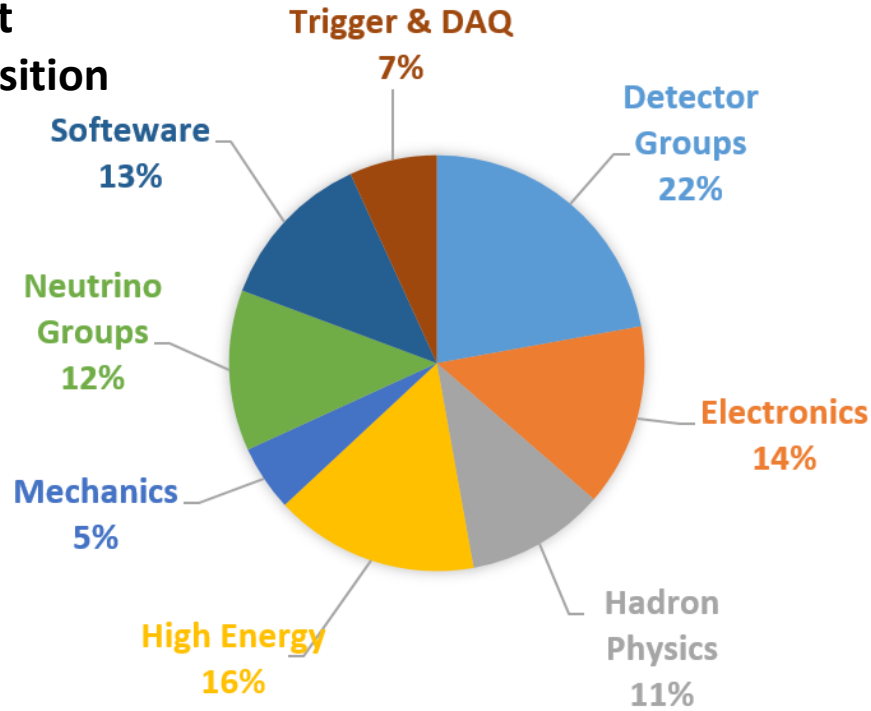
Frontier R&D for world-leading detectors

The first X-ray pixel detector in China for light sources

Deep involvement in wide int-col.

Recruitment opportunities

Current composition

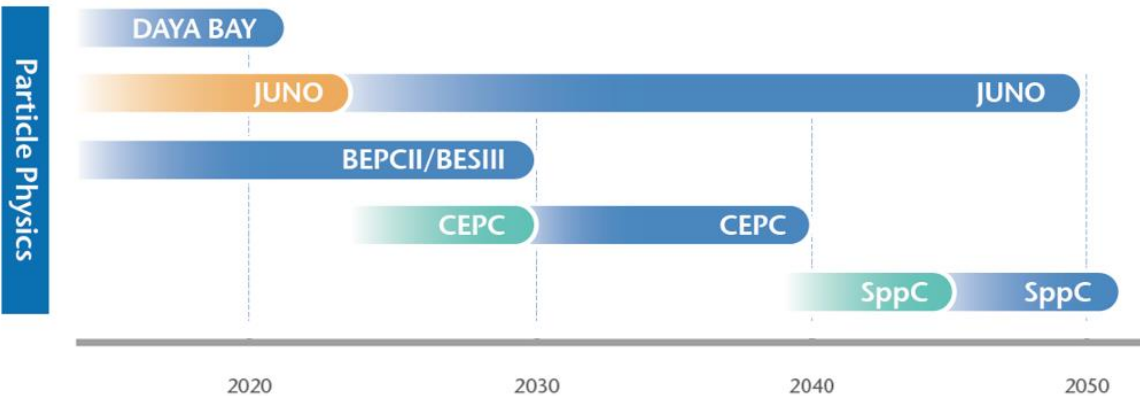


Planned recruitment:

- Faculty: 5 ~ 10 /yr
- Postdoc: 50 – 60 /yr

* Depending on project requirements, the LHC postdocs may need to station at CERN

Projects	Contacts
JUNO	Liangjian Wen (wenlj@ihep.ac.cn)
BESIII	Shuangshi Fang (fangss@ihep.ac.cn)
CEPC	Xinchou Lou (xinchou@ihep.ac.cn)
ATLAS	Joao Guimaraes Costa (guimaraes@ihep.ac.cn)
CMS	Mingshui Chen (chenms@ihep.ac.cn)
LHCb	Jianchun Wang (jwang@ihep.ac.cn)
Electronics	Wei Wei (weiw@ihep.ac.cn)
Detector	Miao He (hem@ihep.ac.cn)
Tech	Mingyi Dong (dongmy@ihep.ac.cn)





We offers :

- Sufficient start-up funding
- Competitive salary
 - support from Chinese Academy of Sciences
 - support from Local government
 - Dongguan city (CSNS), Kaiping city (JUNO), Jinan city
- Relocation expenses
- All standard benefits: insurance package, housing subsidy etc.
- Help in enrolling children in kindergarten and school