



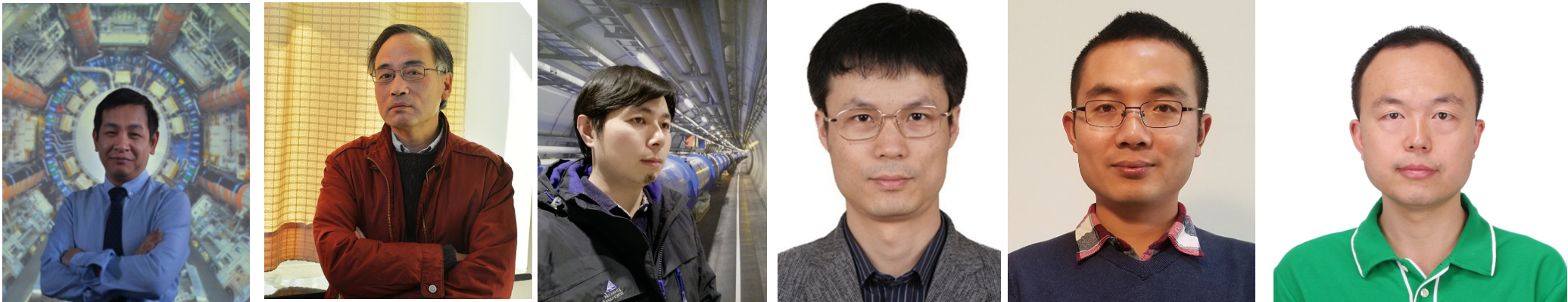
Joining the ILD: the Application from IHEP

Manqi Ruan

Forewords

- As the electron positron Higgs factory, the CEPC and ILC have
 - Similar detector performance requirements, and center of mass energy (ILC 1st phase)
 - Different in collision environment, beam polarization
- Starting from the ILD concept, the CEPC physics detector group performed intensive physics potential, detector performance requirement-optimization studies, and many detector R&D.
- Six staffs of the CEPC physics & detector group at IHEP are included in this application, We hope our participation could contribute to the ILD actively & significantly.

The Team

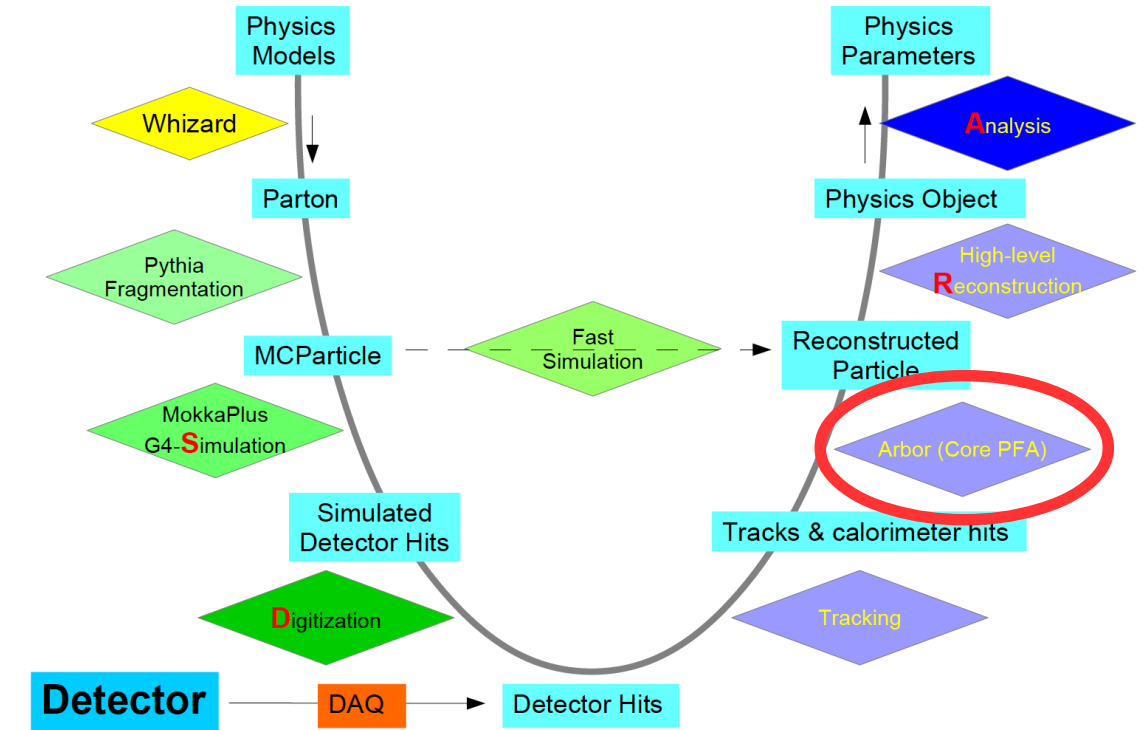
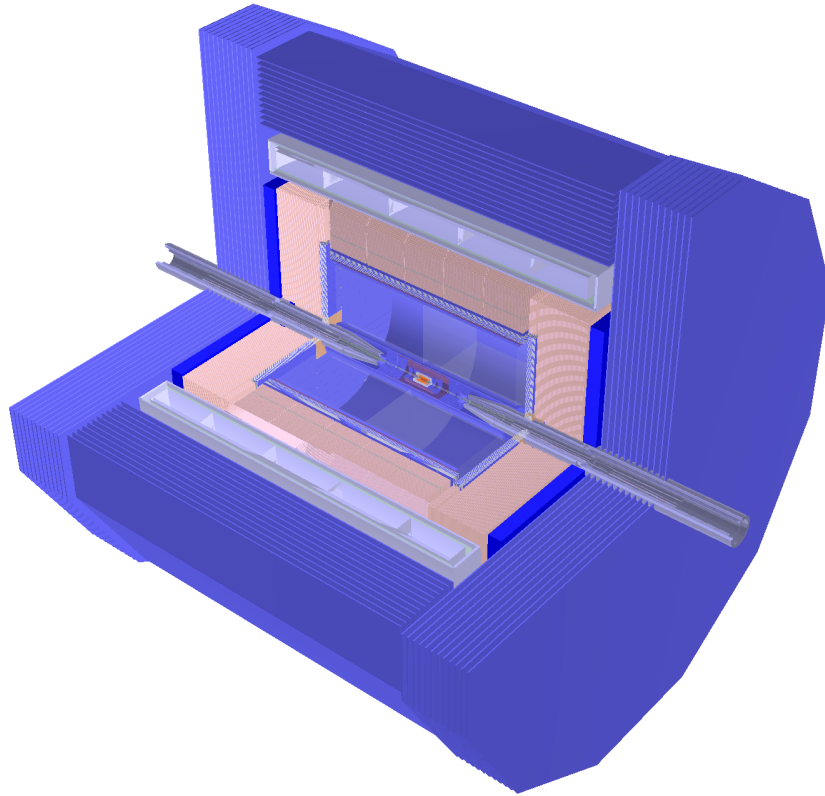


- Yaquan Fang, Researcher, Convener of CEPC simulation;
- Ouyang Qun, Researcher, Convener of CEPC Vertex detector;
- Manqi Ruan, Researcher, Convener of CEPC Simulation;
- Chengdong Fu, Associate researcher, Geant4/Software expert;
- Yunpeng Lu, Associate Researcher, silicon pixel sensor/electronics expert;
- Huirong Qi, Associate Researcher, Convener of CEPC TPC;

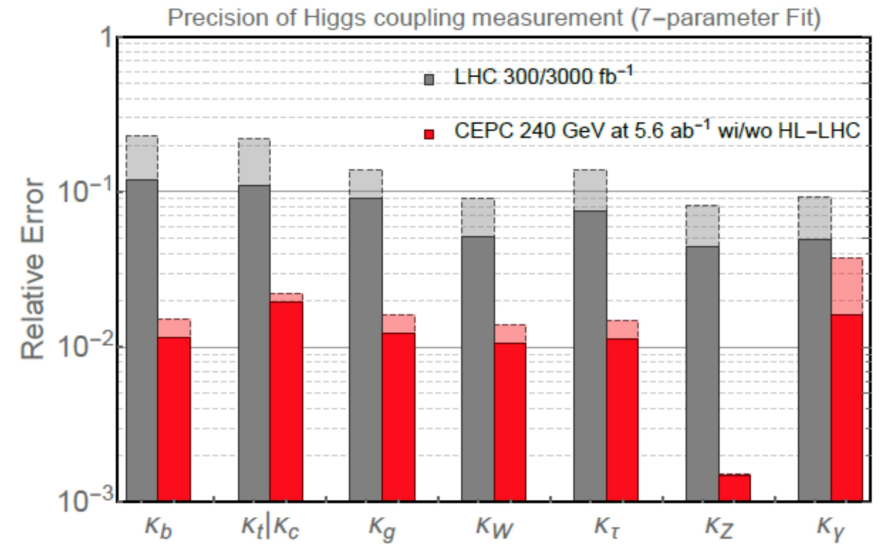
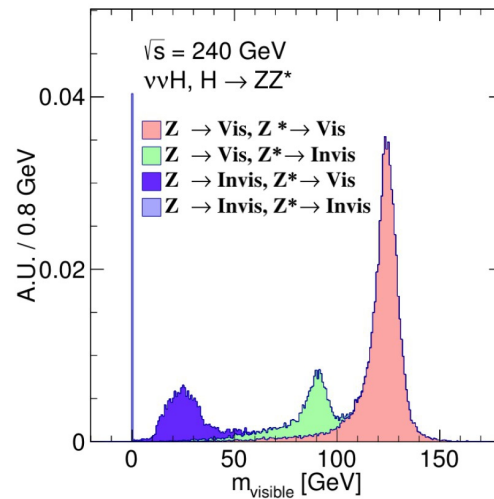
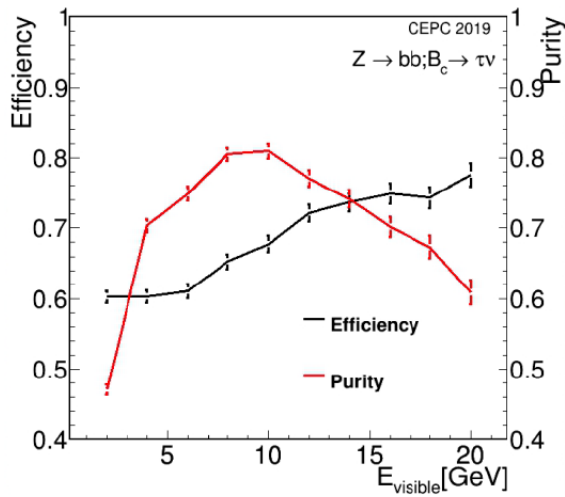
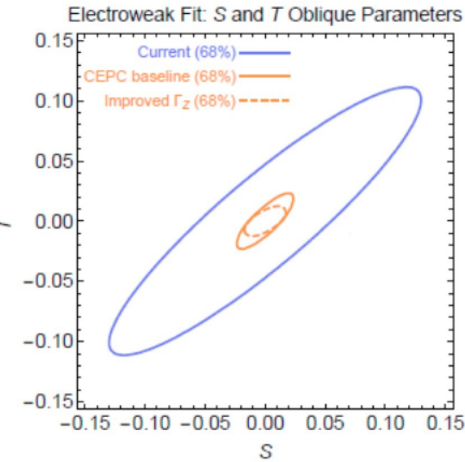
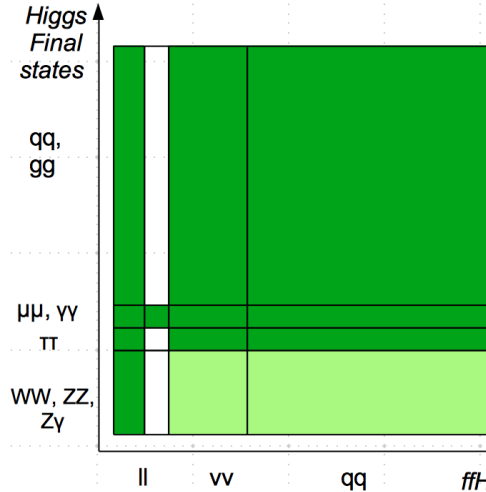
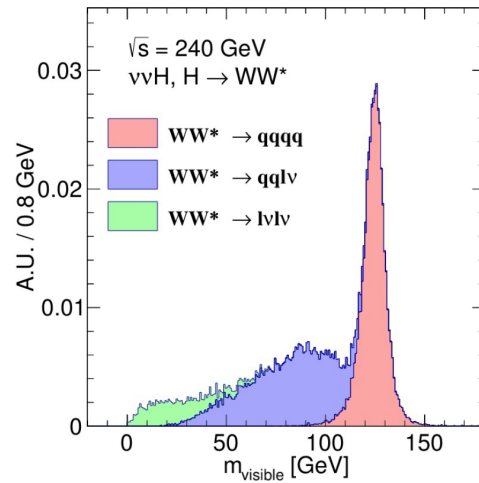
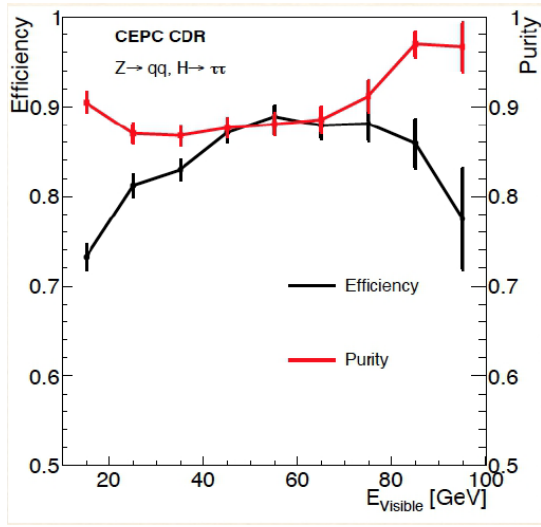
The Team

- Contact: Manqi Ruan
- Subgroups
 - Physics + Software: Yaquan Fang, Manqi Ruan
 - Software: Chengdong Fu, Manqi Ruan
 - Detector:
 - Silicon detector: Yunpeng Lu, Qun Ouyang
 - TPC: Huirong Qi
- PostDocs: Dan Yu, Yudong Wang.
- Students: ~ 4 students
- Total: 6 Staffs, 2 PostDocs, 4 Students

CEPC Baseline detector/software at the CDR



Objects, signals & physics potential

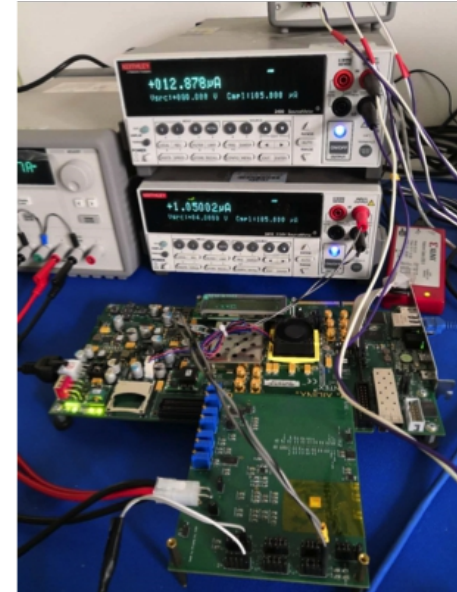


Physics & Software

- Physics:
 - Continue/enhance the physics potential study: benchmarks, new analysis ideas/methods
- Reconstruction:
 - Physics object reconstruction, new event description method
- Requirement – Optimization: further explore the dependence between
 - Benchmark accuracy and detector performance (requirement oriented)
 - Performance and technology/geometry (optimization oriented)
- Software:
 - Provide necessary tool to support above studies
 - Actively participate the Key4Hep project

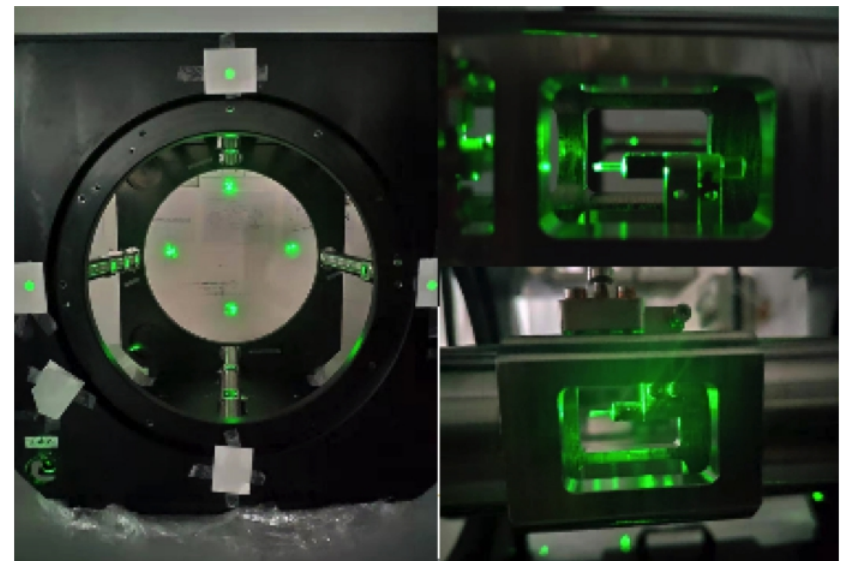
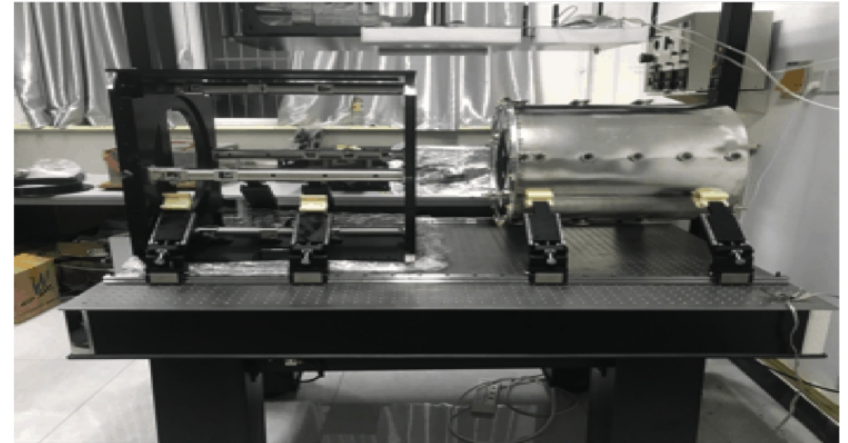
The Vertex detector

- Expertise:
 - Pixel sensor readout
 - CMOS & SOI pixel design & Test
- Staff: Yunpeng LU
- Plan
 - Development of readout test system
 - Characterization of Monolithic Pixel sensor
 - Design & optimization of sensor diode and Front-end system



TPC

- LCTPC member since Dec. 2016
- Staff: Huirong Qi
- Plan
 - Continue R&D within LCTPC
 - Alignment & Calibration study using narrow UV laser beam
 - Low power FE Electronic development
 - Explore the pixel TPC technology with NIKEHF

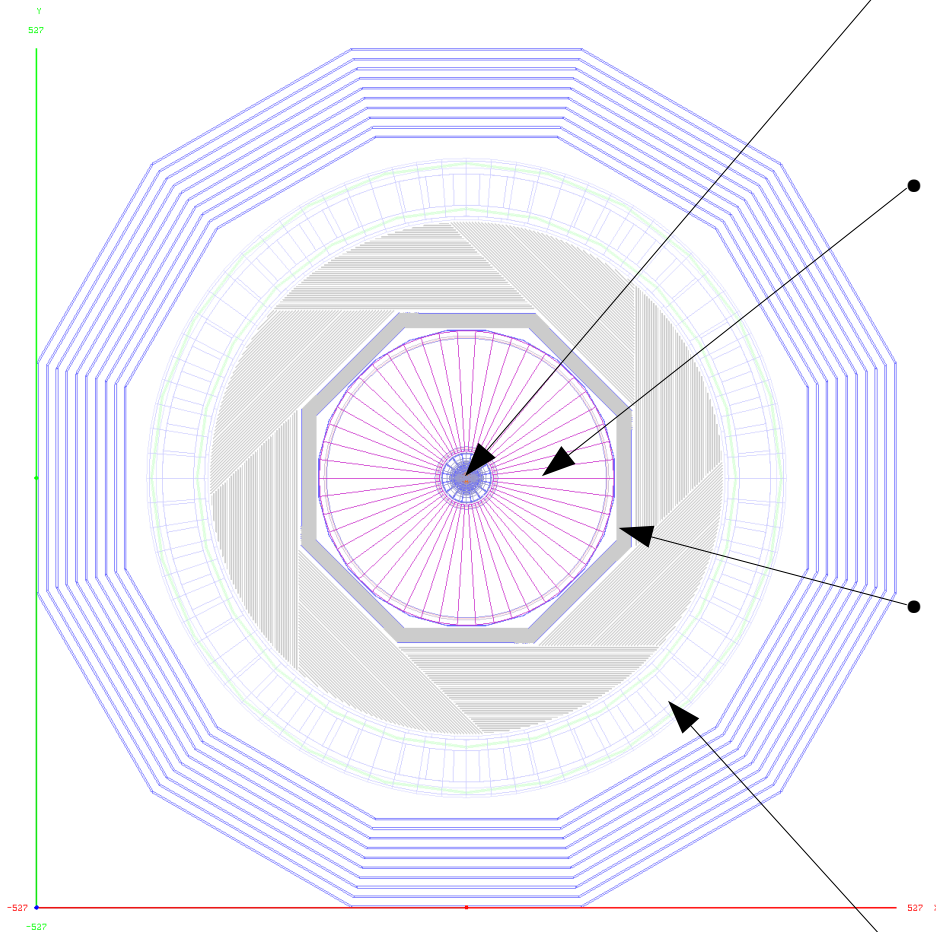


Further development plan

- Team objectives: Participate the physics program, and the construction & commissioning of the detector
- Team might be enhanced with other activities such as Calorimeter, etc.
- Actively seeking for funding support.

Thank you!

An ILD-like detector at the CEPC



- Different collision environments/rates :

- MDI design & Implementation: [CEPC-SIMU-2017-001](#)

- The CEPC event rate is significantly higher than linear colliders, charged kaon id can strongly enhance the CEPC flavor physics program

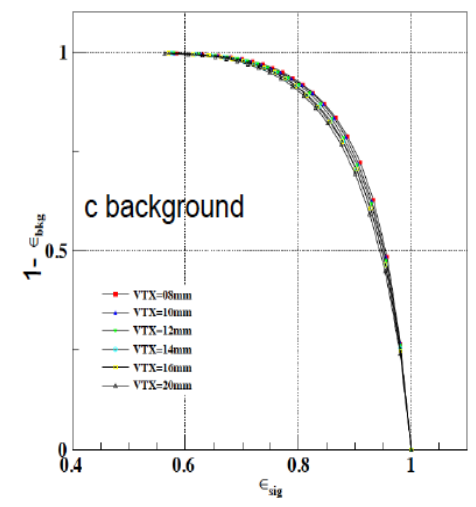
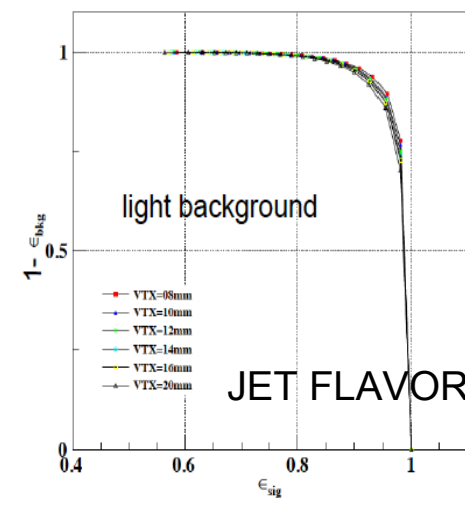
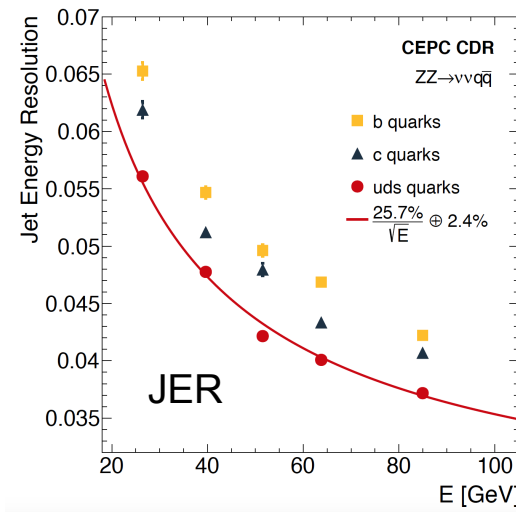
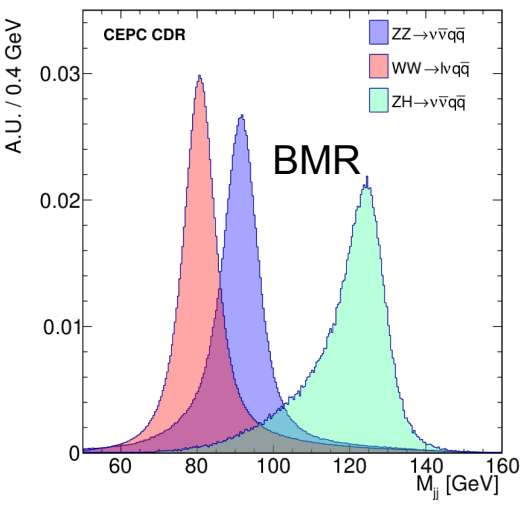
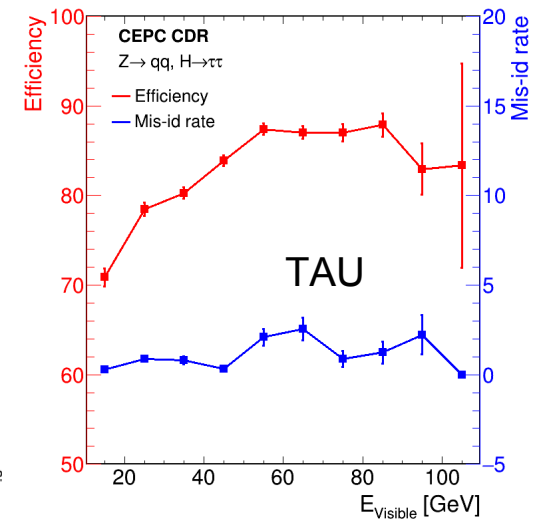
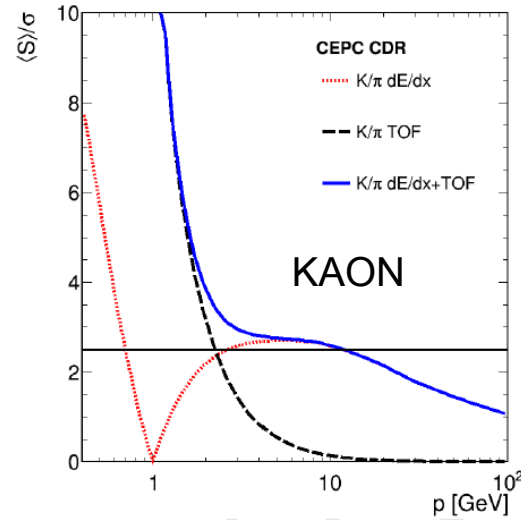
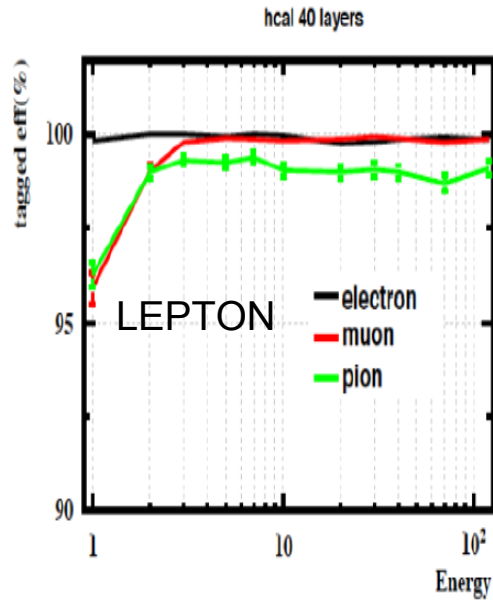
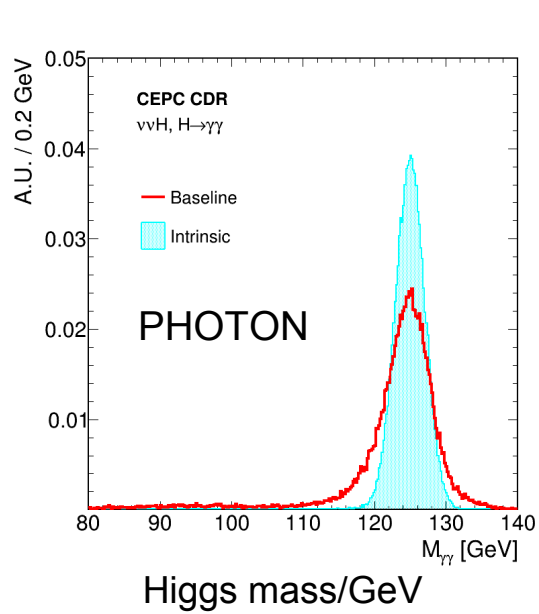
- TPC Feasibility: [JINST-12-P07005 \(2017\)](#)
- Pid using TPC dEdx and ToF: [Eur. Phys. J. C \(2018\) 78:464](#)

- No power pulsing at CEPC detector

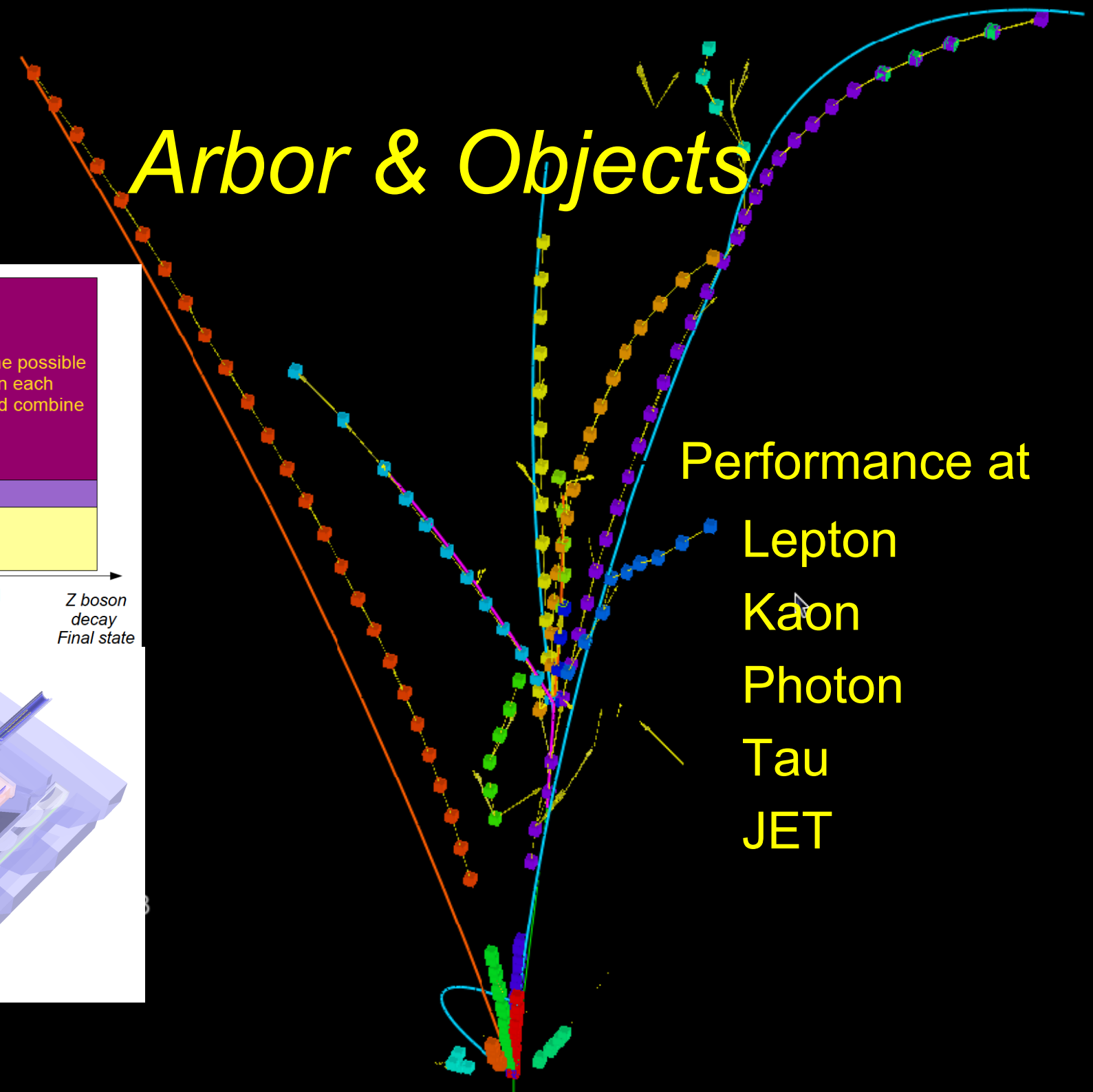
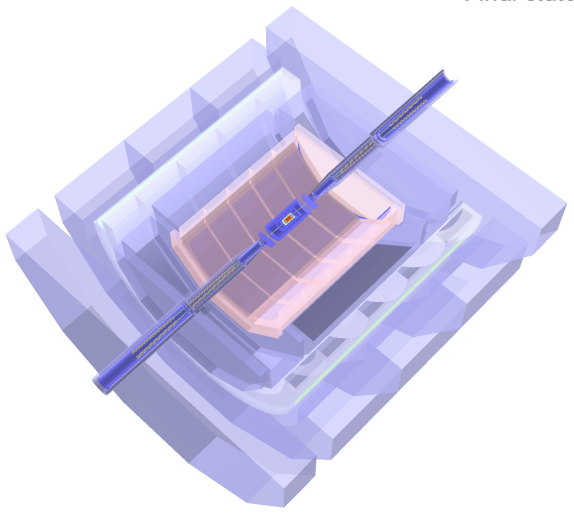
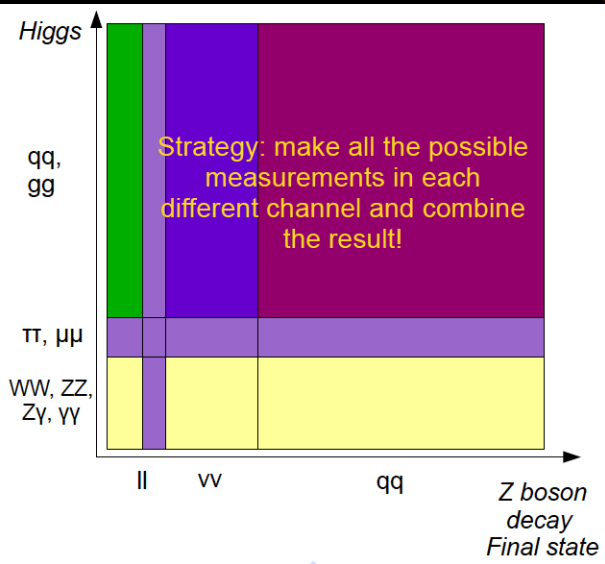
- A significant reduction of the readout channel, especially the Calorimeter Granularity: [JINST-13-P03010 \(2018\)](#)
- HCAL Optimization

- 3 Tesla Solenoid: requested by the Accelerator/MDI

Physics Objects



Arbor & Objects



Performance at

- Lepton
- Kaon
- Photon
- Tau
- JET

APODIS with Full Silicon Tracking...

