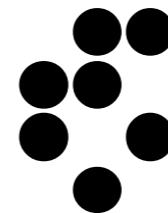




TOP counter for Belle II

Tara Nanut



Jožef Stefan Institute

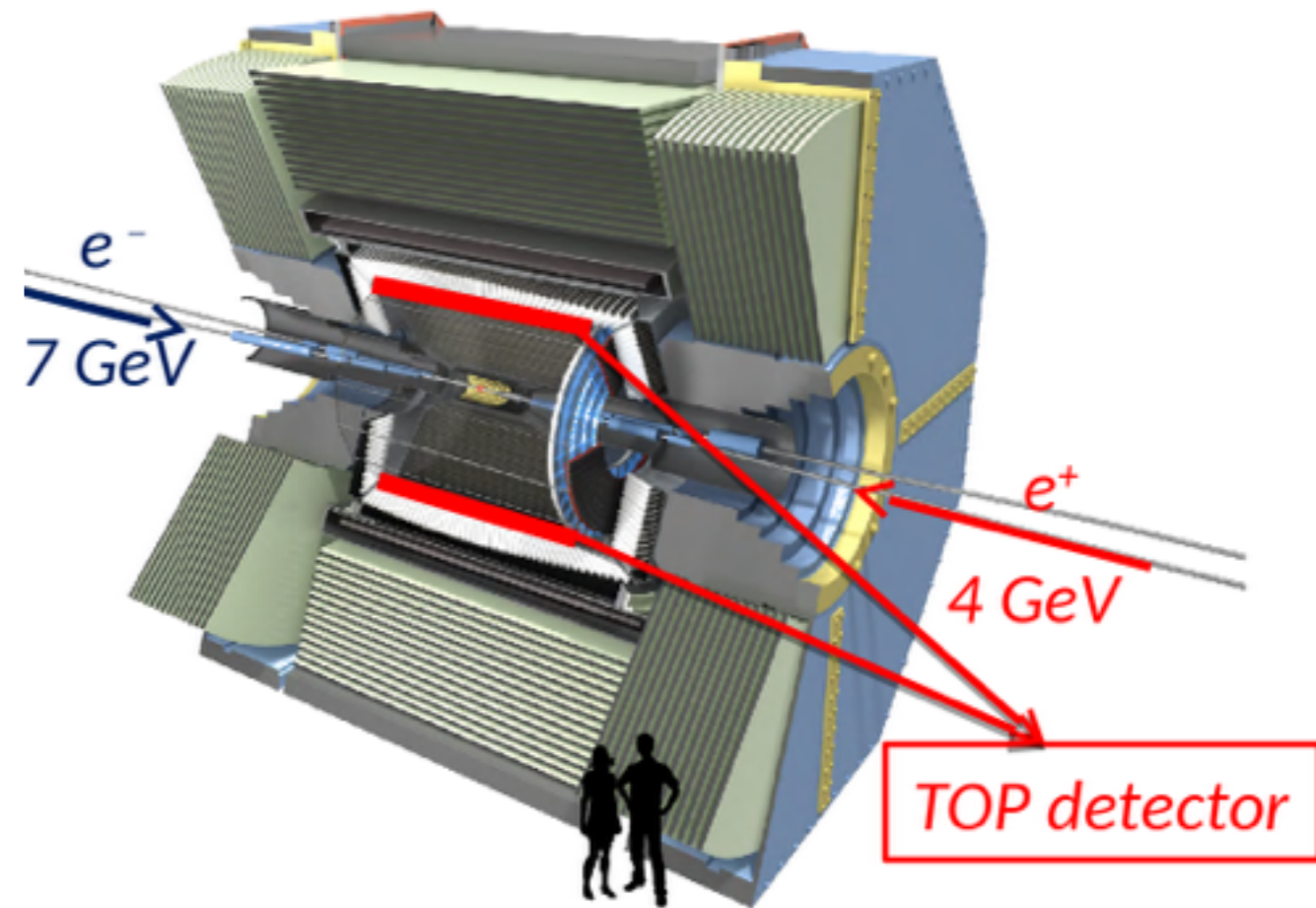
JENNIFER Consortium General Meeting

QMUL, London, UK
22 September 2016

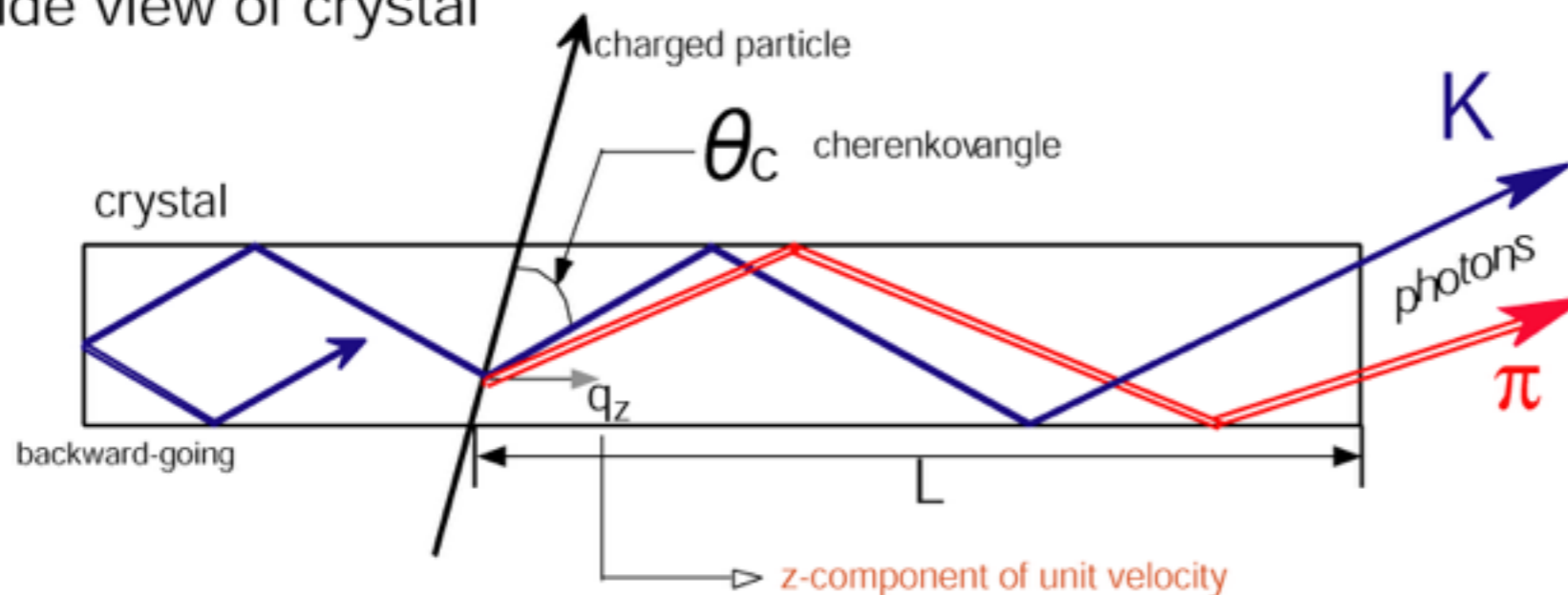


TOP counter for Belle II

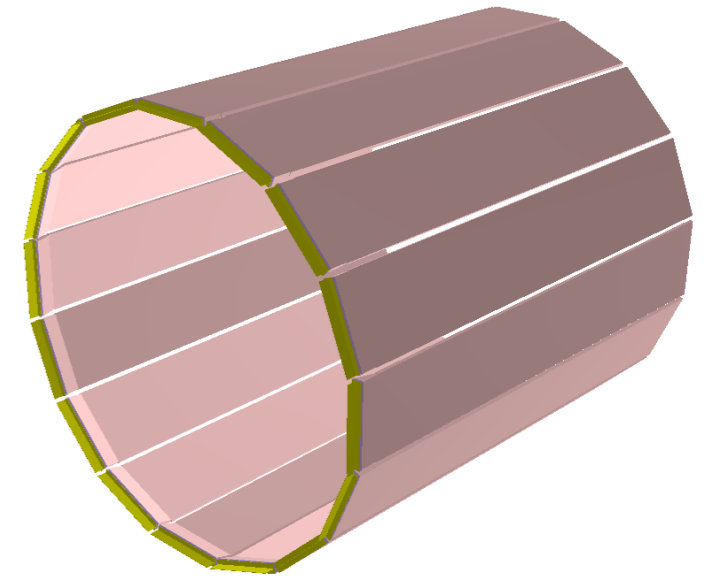
- Particle identification system for Belle II detector @ SuperKEKB asymmetric e^+e^- collider
- New type of PID device
- core: quartz bar (radiator)



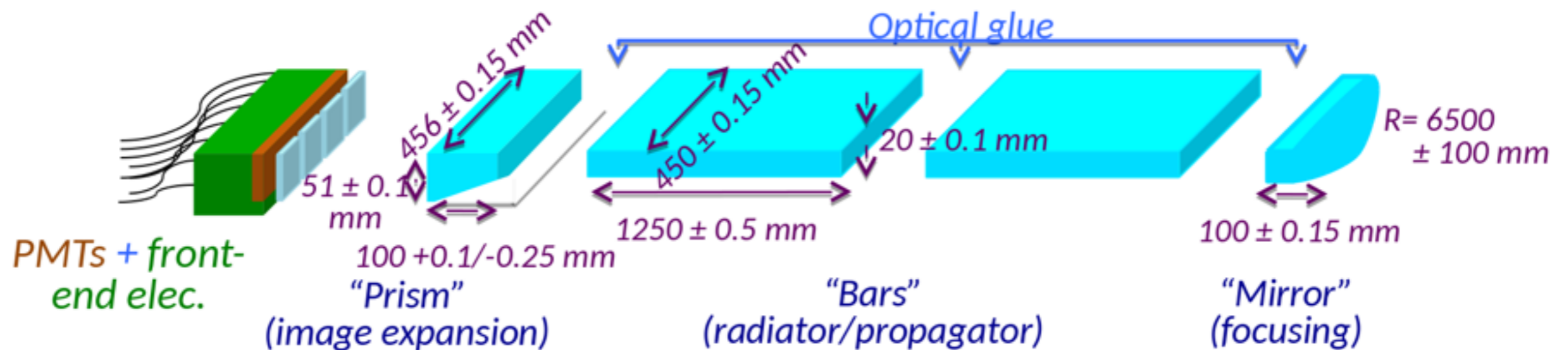
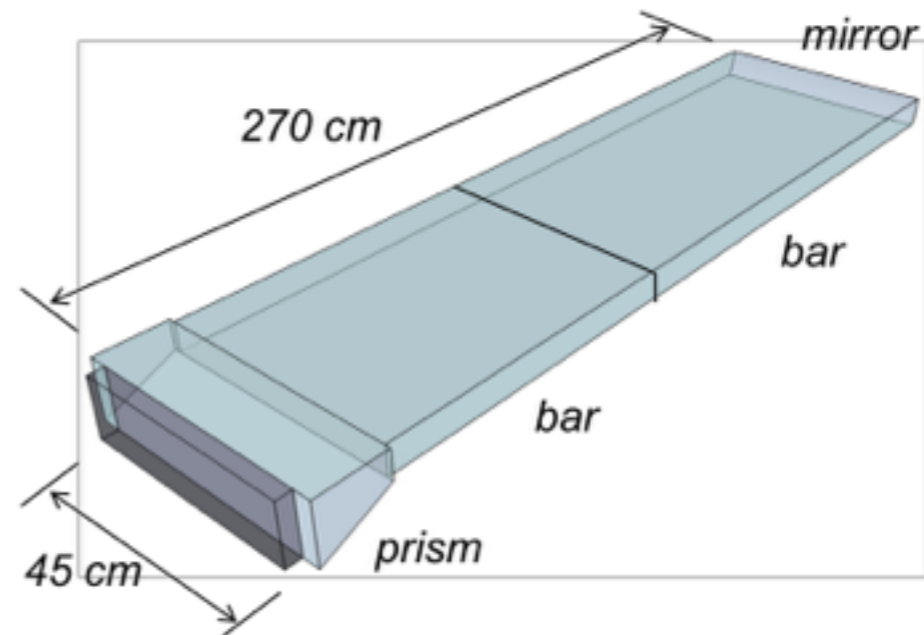
Side view of crystal



TOP geometry



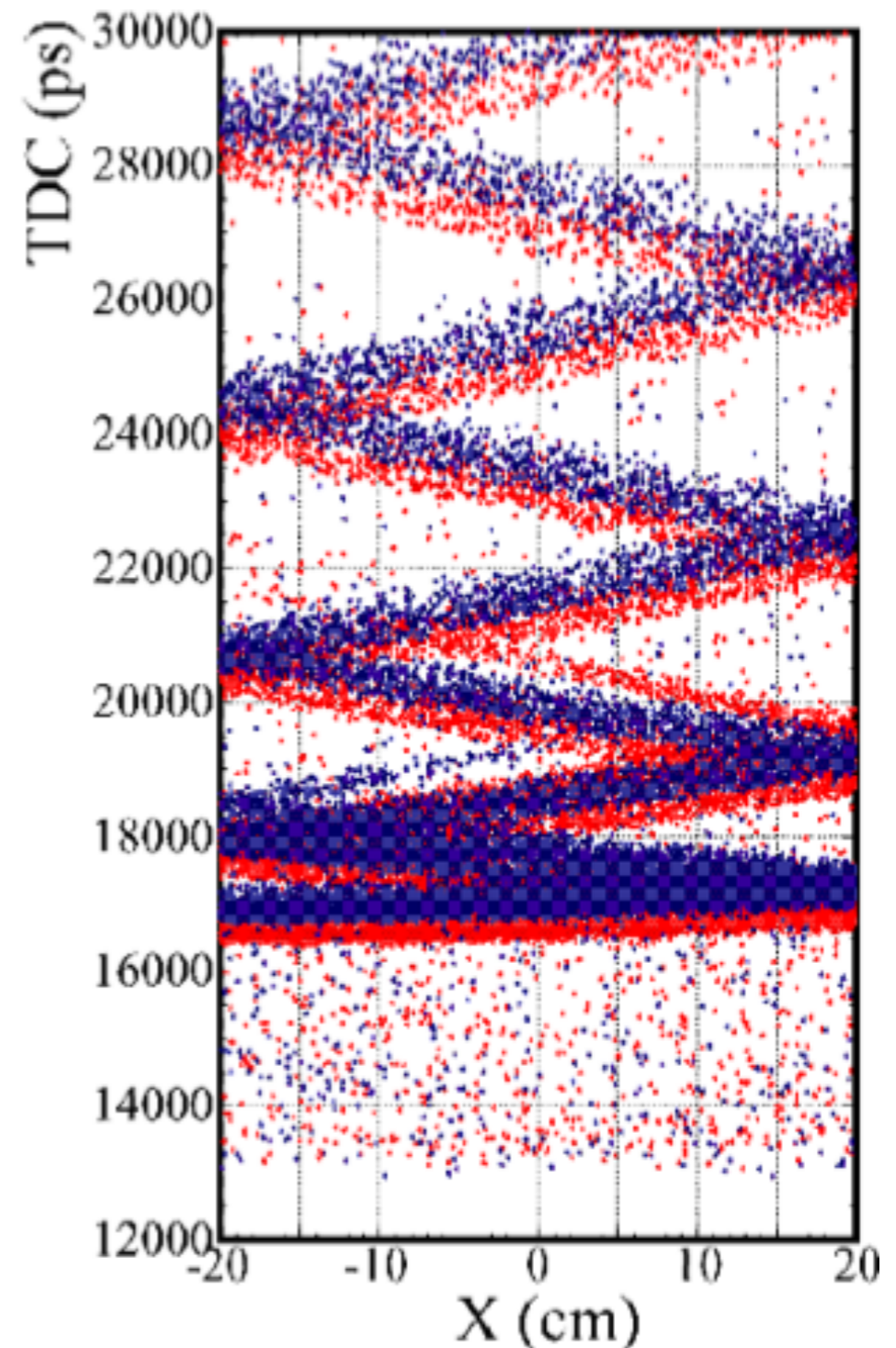
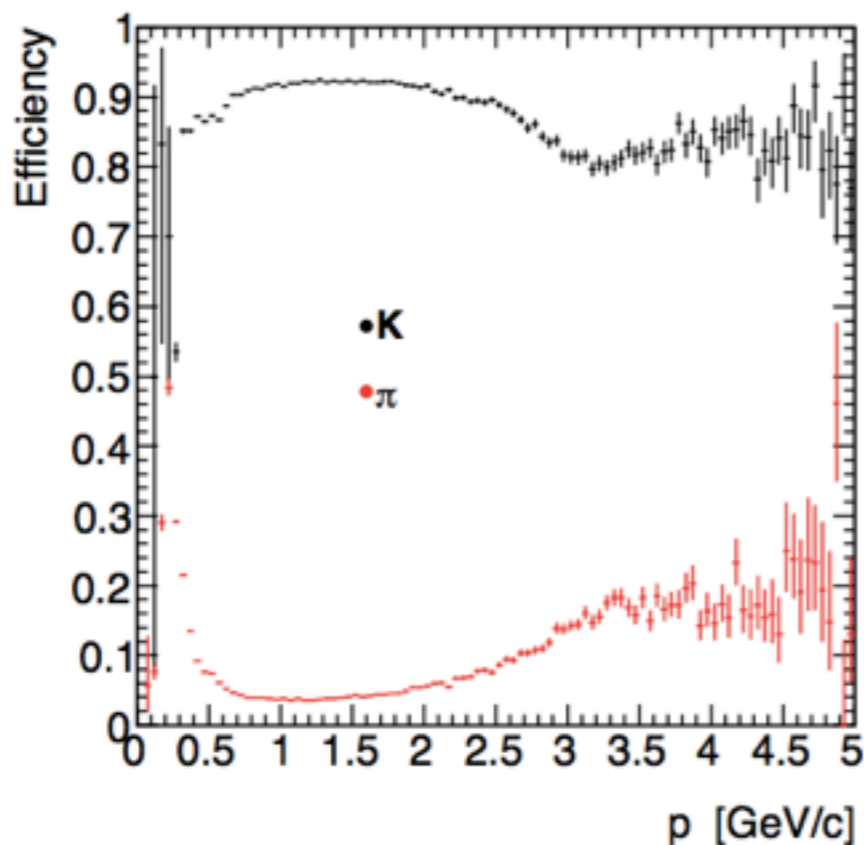
- 16 modules at R=120cm
- focusing mirrors
- expansion prism
- photo detectors: MCP-PMTs
- wave-form sampling electronics

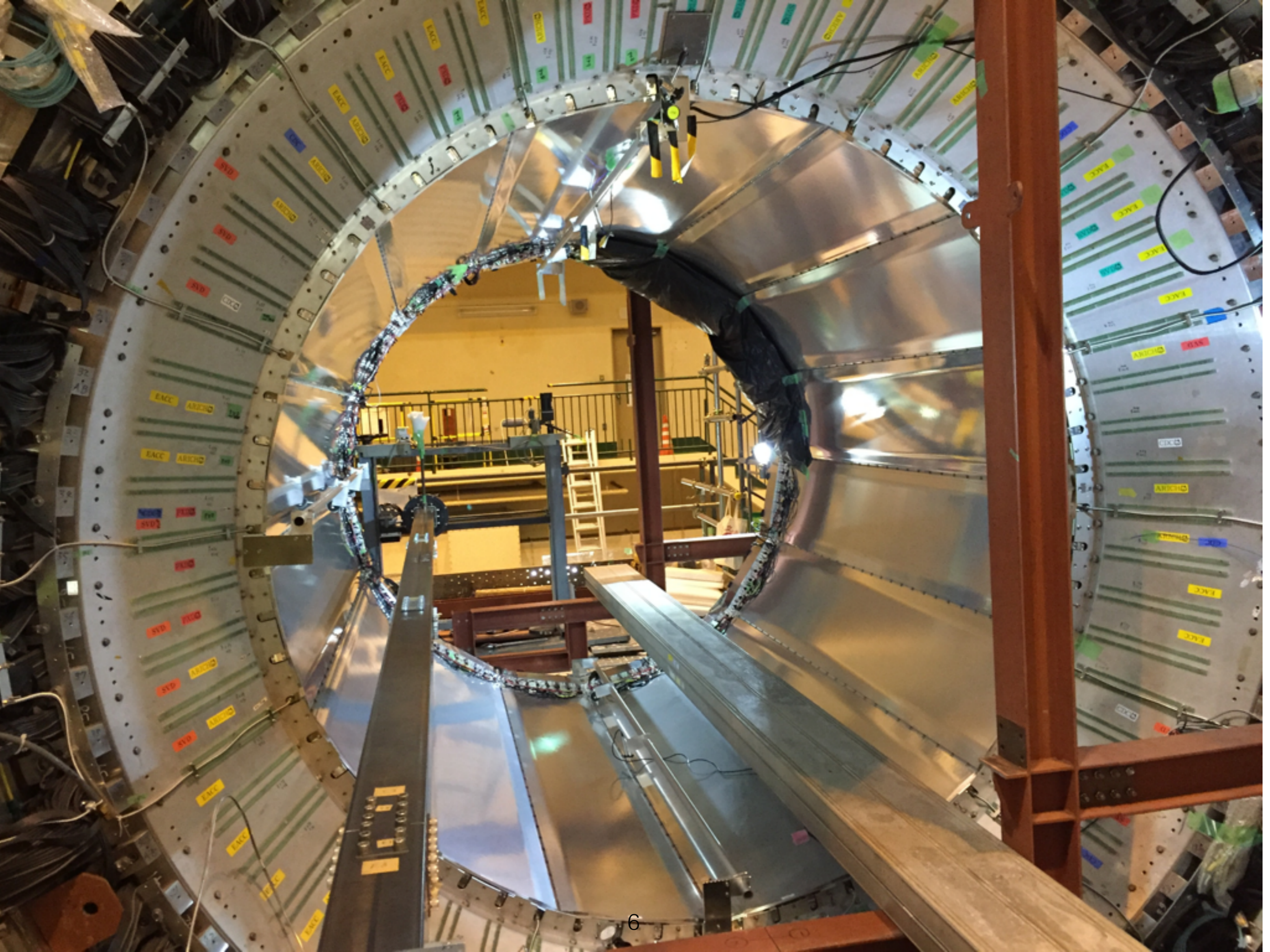




Expected performance

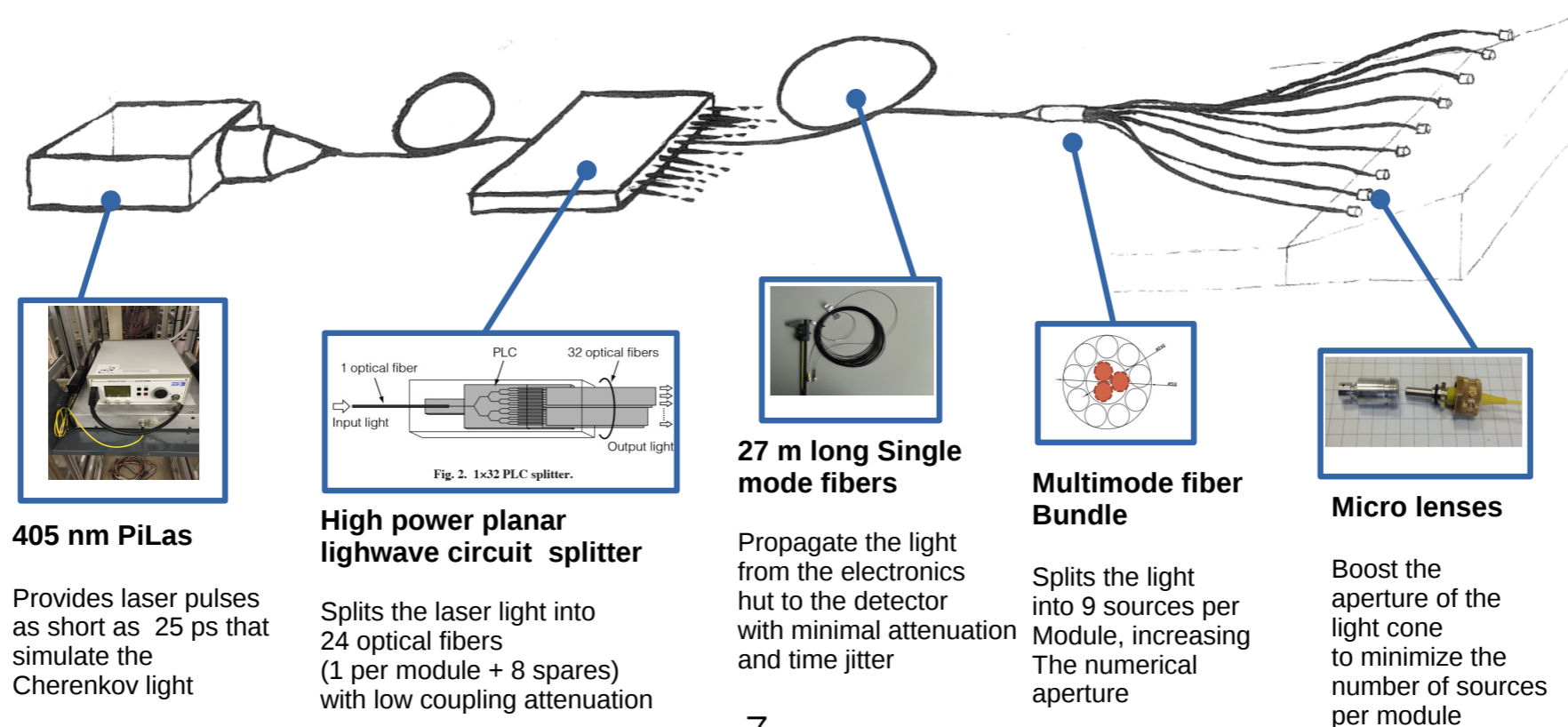
- measure x-y position of photons
- measure time of arrival: ~ 50 ps resolution
- Overall: 92% pion efficiency, 7.4% kaon fake rate





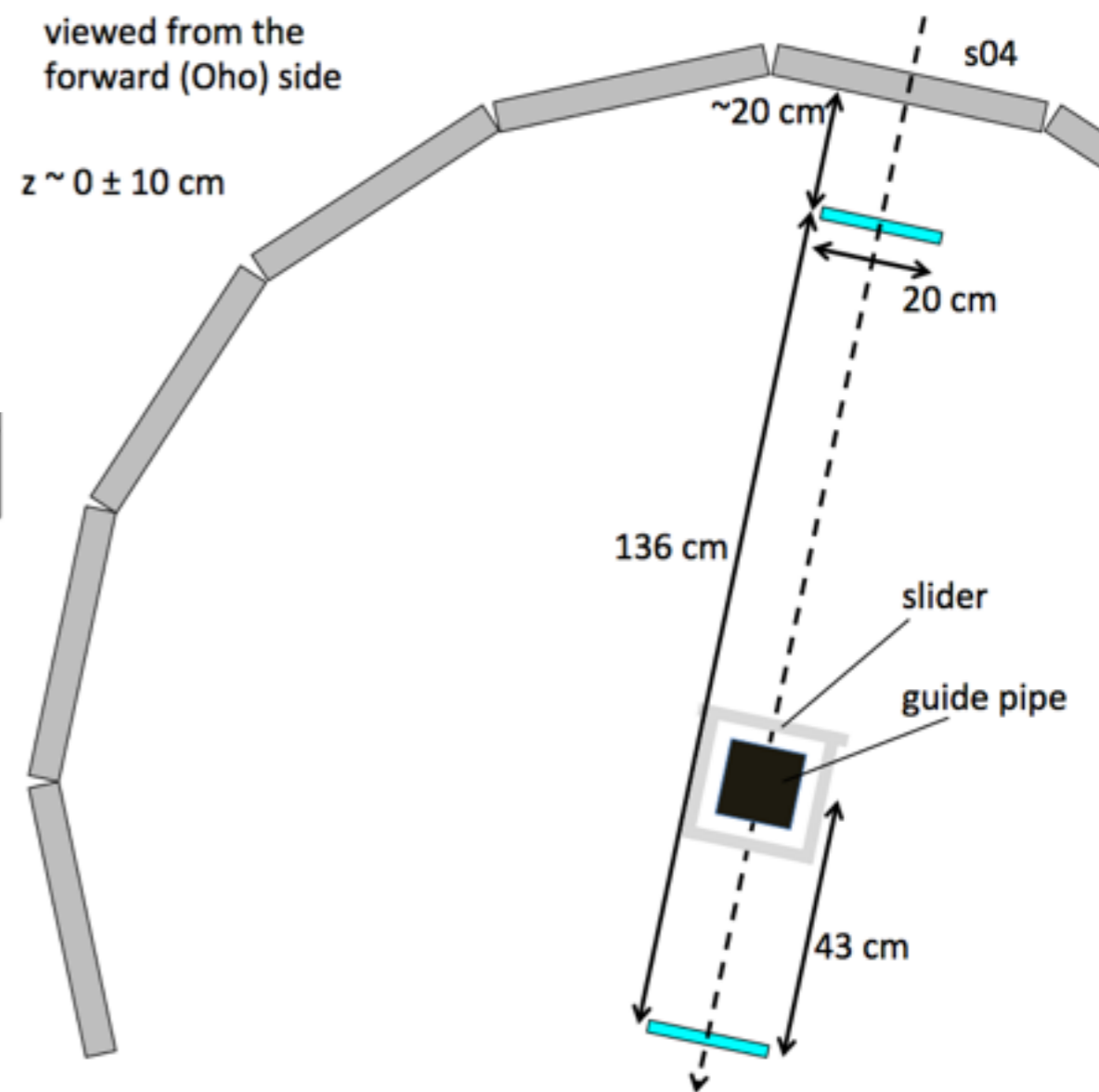
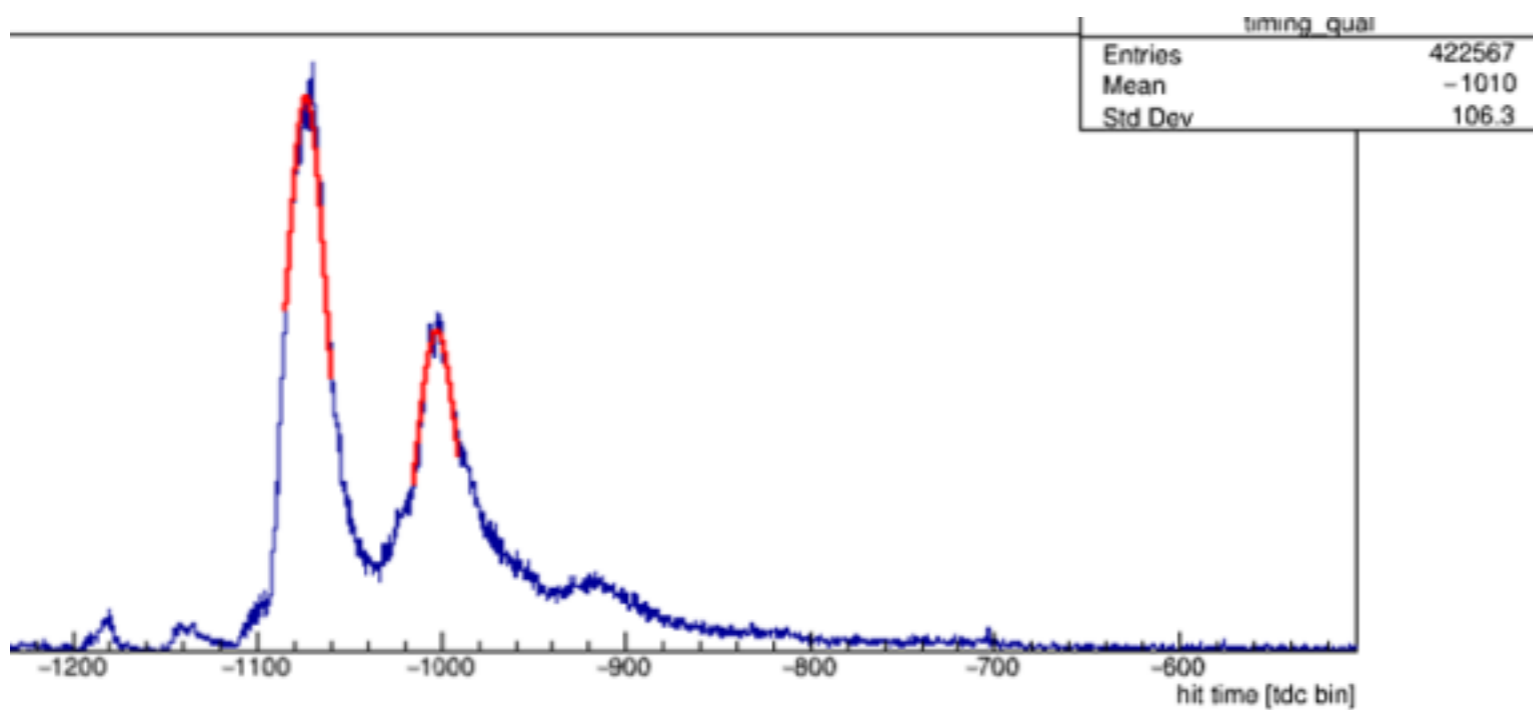
Calibration system

- A chain of optical fibres terminated with micro lenses that splits and pipes the light of a PicoLaser to the front-end PMTs
- Provides picosecond-level light pulse to calibrate the front-end electronics
- Monitor PMT response and optical coupling quality
- Installed and operating since spring 2016



First cosmic tests

- Simple scintillator paddle trigger
- Reasonable results





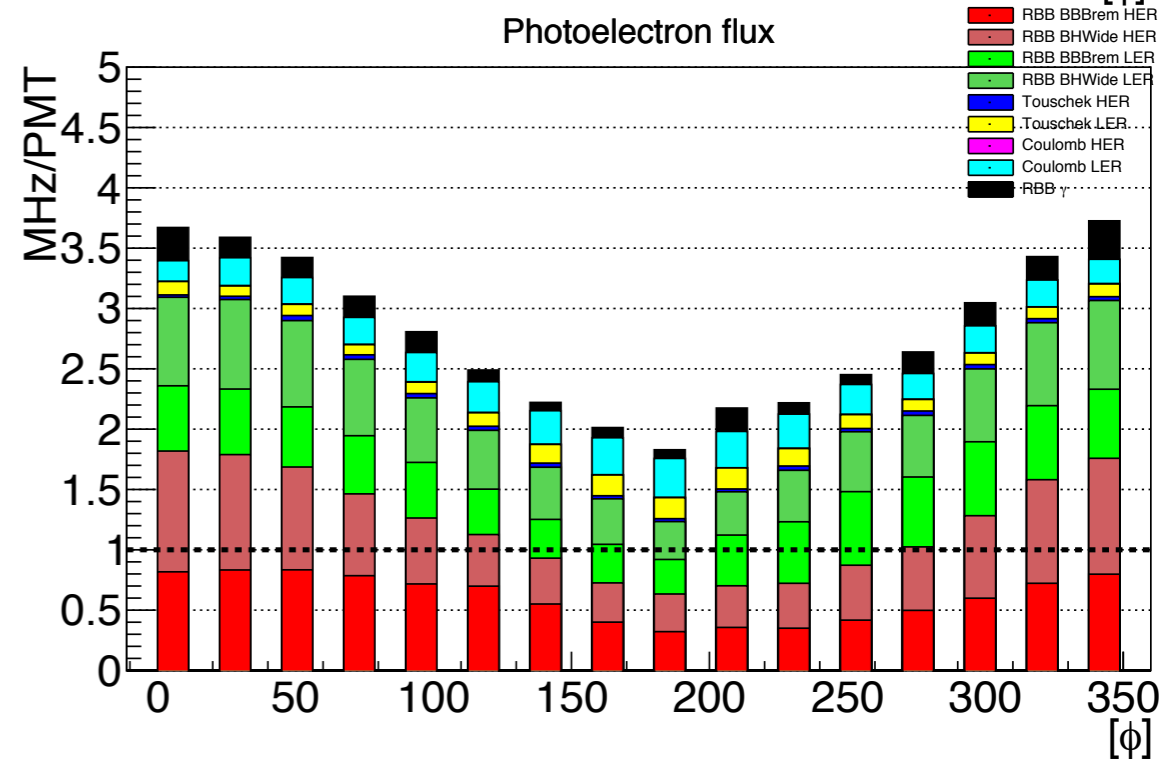
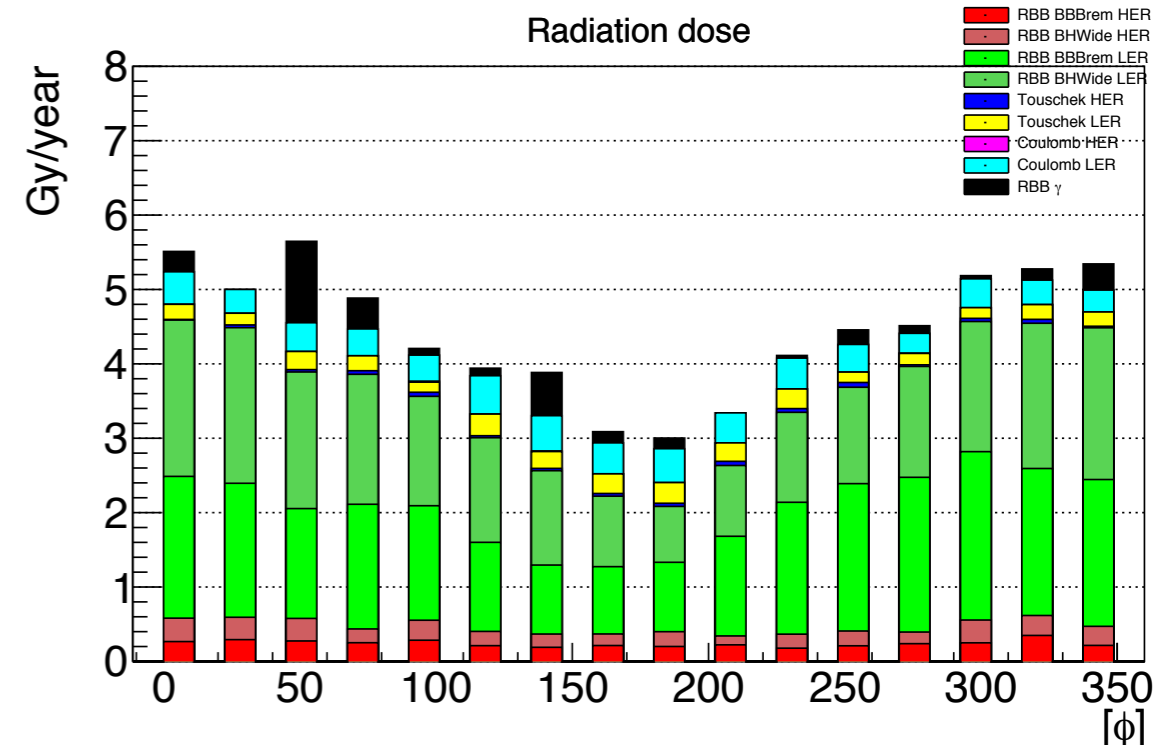
Beam background in TOP

Beam background sources:

- Radiative Bhabha
- Touschek scattering
- Coulomb scattering

Simulating (at nominal accelerator operation):

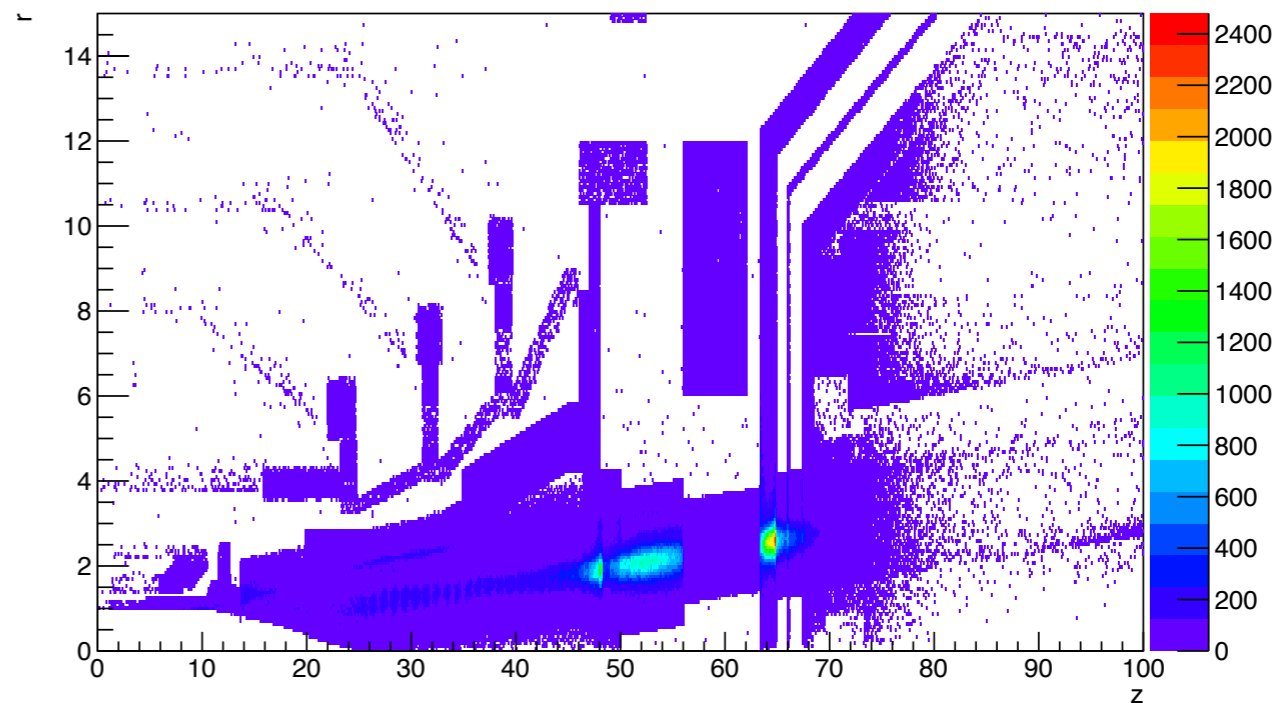
- Neutron flux and radiation dose on circuit boards
- Photon energy distribution and radiation dose for lenses for calibration system
- Photoelectron flux on PMTs
- Search for hotspots, explore shielding possibilities



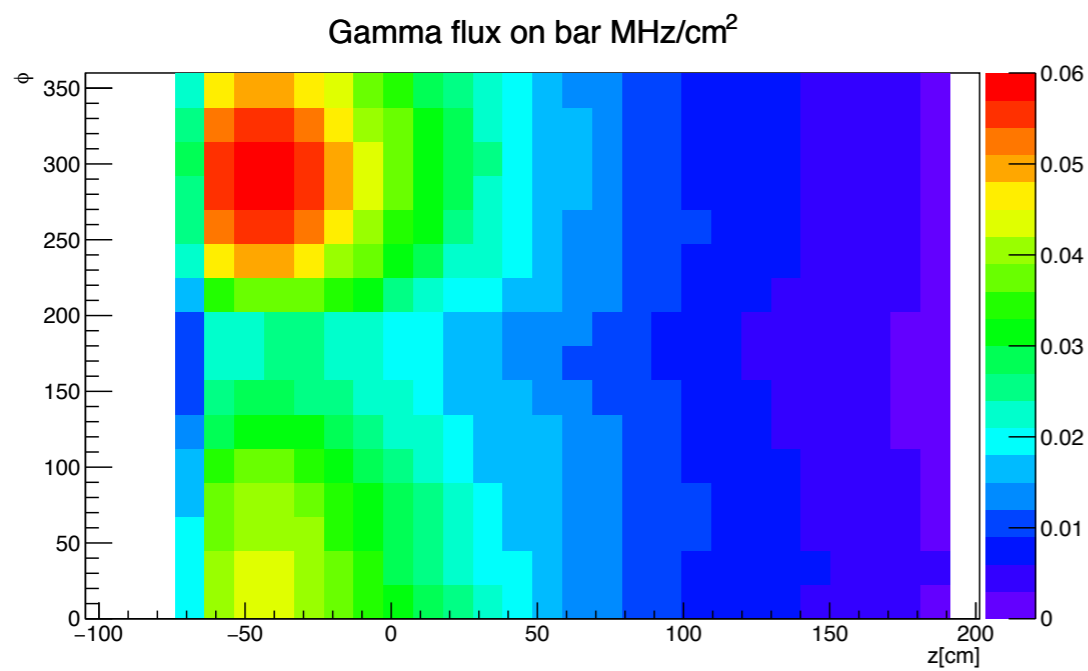


Beam background in TOP

- Explore hotspots:

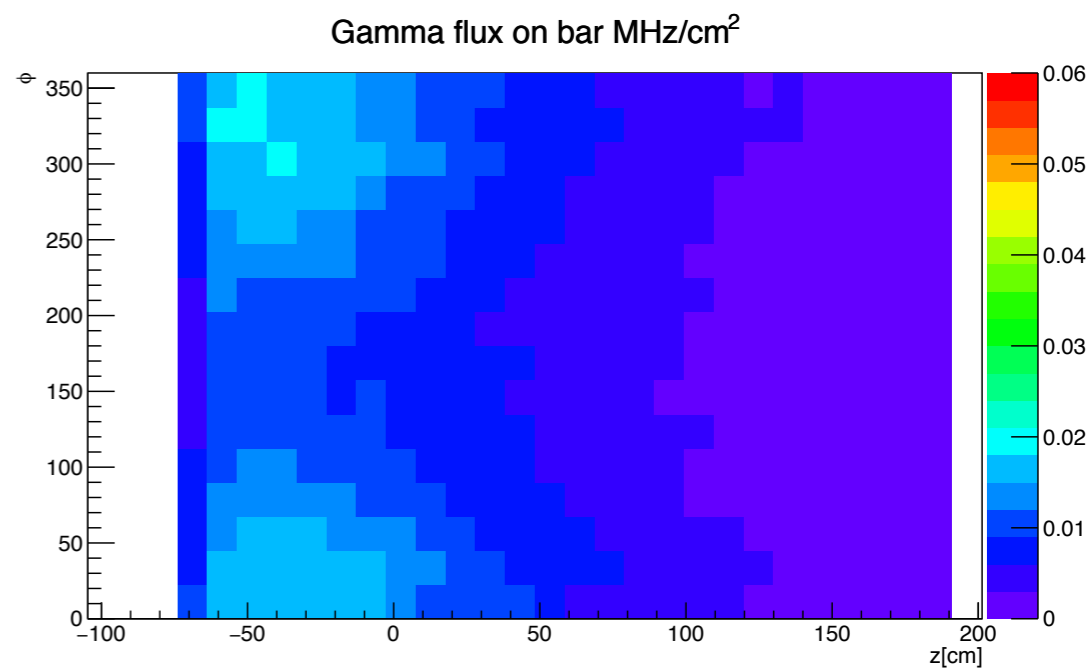


- Explore possible additional heavy-metal shielding:



shield
→

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Summary

- Detector is **successfully installed**, no incidents
- Read-out electronics is being commissioned
- First cosmic tests give **reasonable results**
- Spring 2017: 3-month test with cosmic rays
- December 2017: expected first e^+e^- collisions
- Spring 2018: TOP counter expected to be **fully commissioned**

JENNIFER support - TOP group

Supported European groups in TOP:

- **Ljubljana**: 4 F.T.E. months - software and simulation
- **Padova and Torino**: 10 F.T.E. months - construction and installation, calibration

JENNIFER support for TOP is substantial:

- **e.g. construction**: 6 out of 35 F.T.E. months for construction were financed by JENNIFER

Future tasks:

- Further development of software
- Detector commissioning
- JENNIFER support is still fundamental!