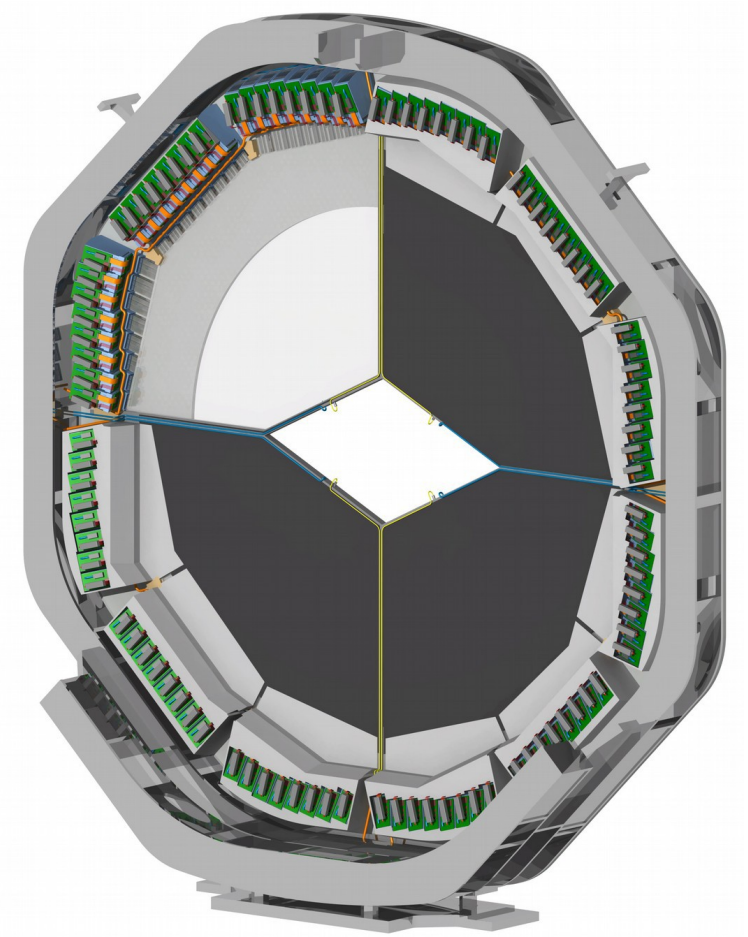
Prototyping PANDA EncapDiscDIRC(EDD)



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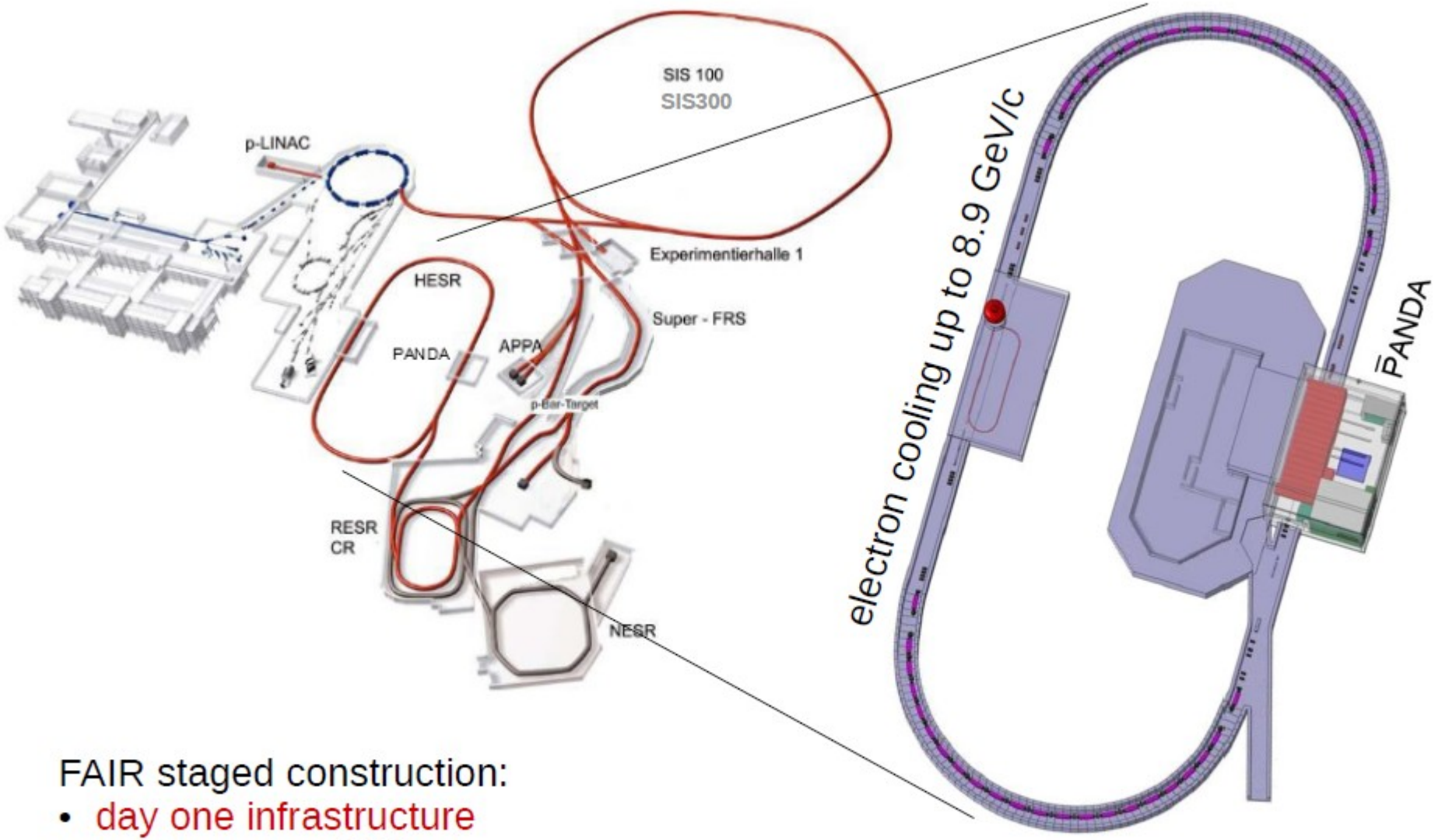
II Phys. Inst. JLU Giessen

Outline

- The Project
- The detector
- Endcap Disc DIRC EDD
- Test Beam campaign for Prototype's
- Test beam wishes for future campaign's

The Project FAIR

https://www.gsi.de/forschungbeschleuniger/fair.htm



FAIR staged construction:

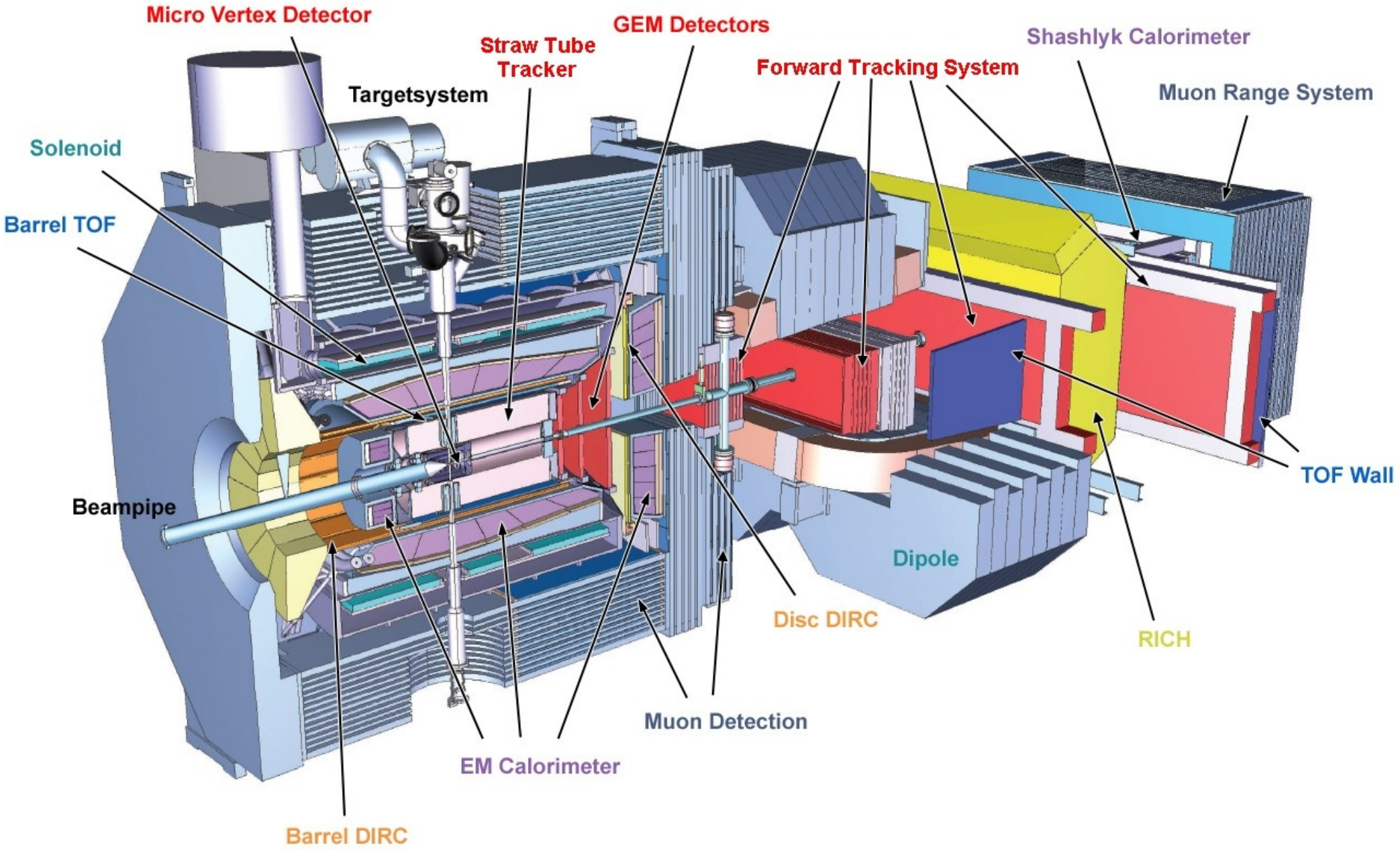
- day one infrastructure
- subsequent additions

High resolution mode: L=1E31cm-2s-1 dp/p=4E-5

High intensity mode: L=2E32cm-2s-1 rate=2E-7/s

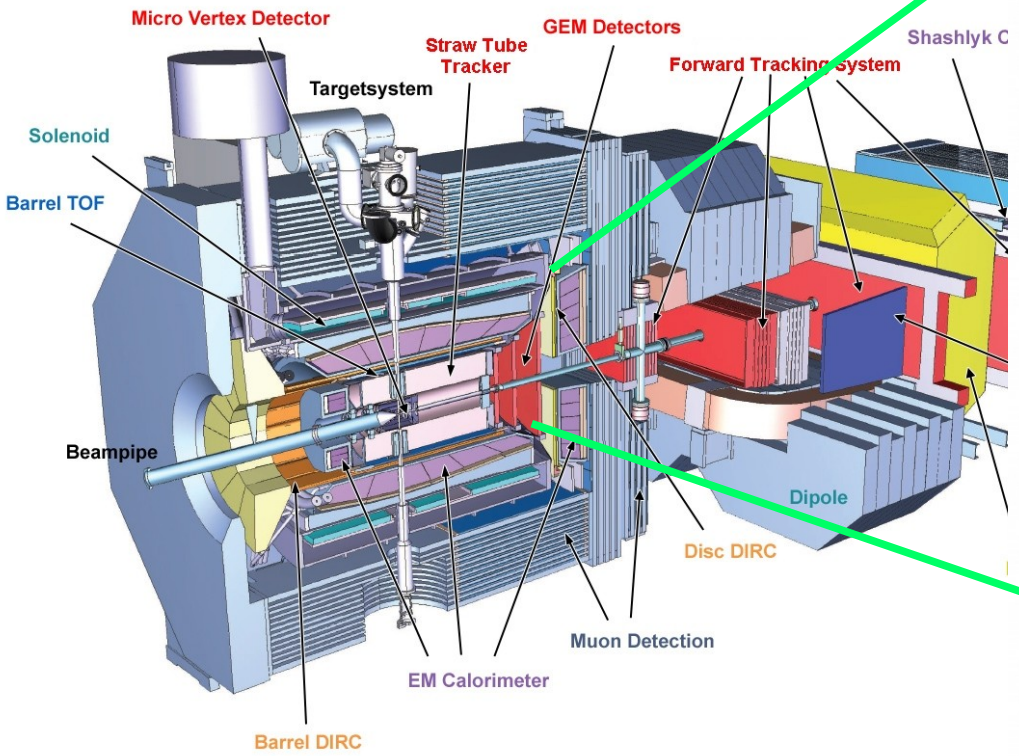
The PANDA detector

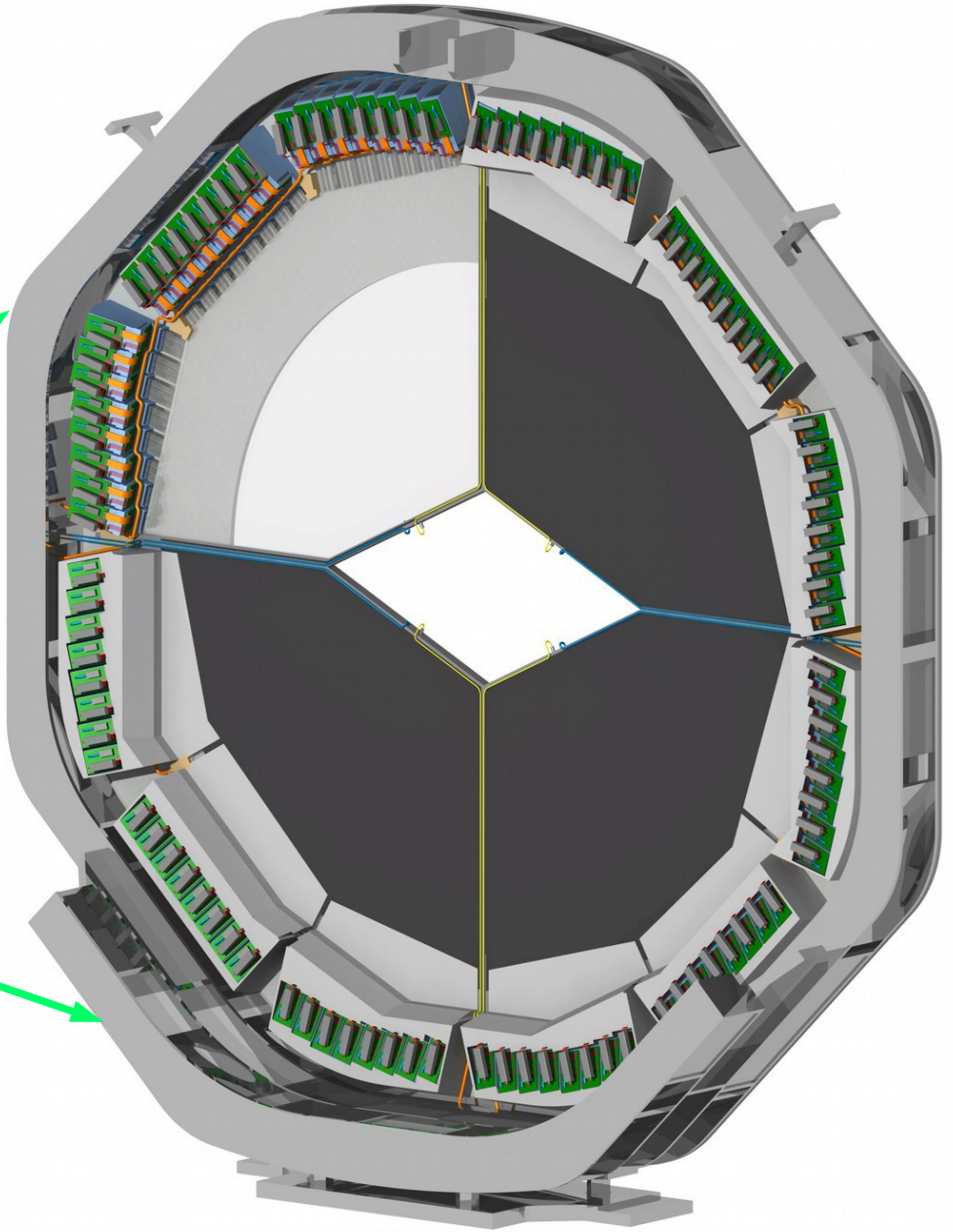
https://panda.gsi.de/



The EDD will be built by Giessen

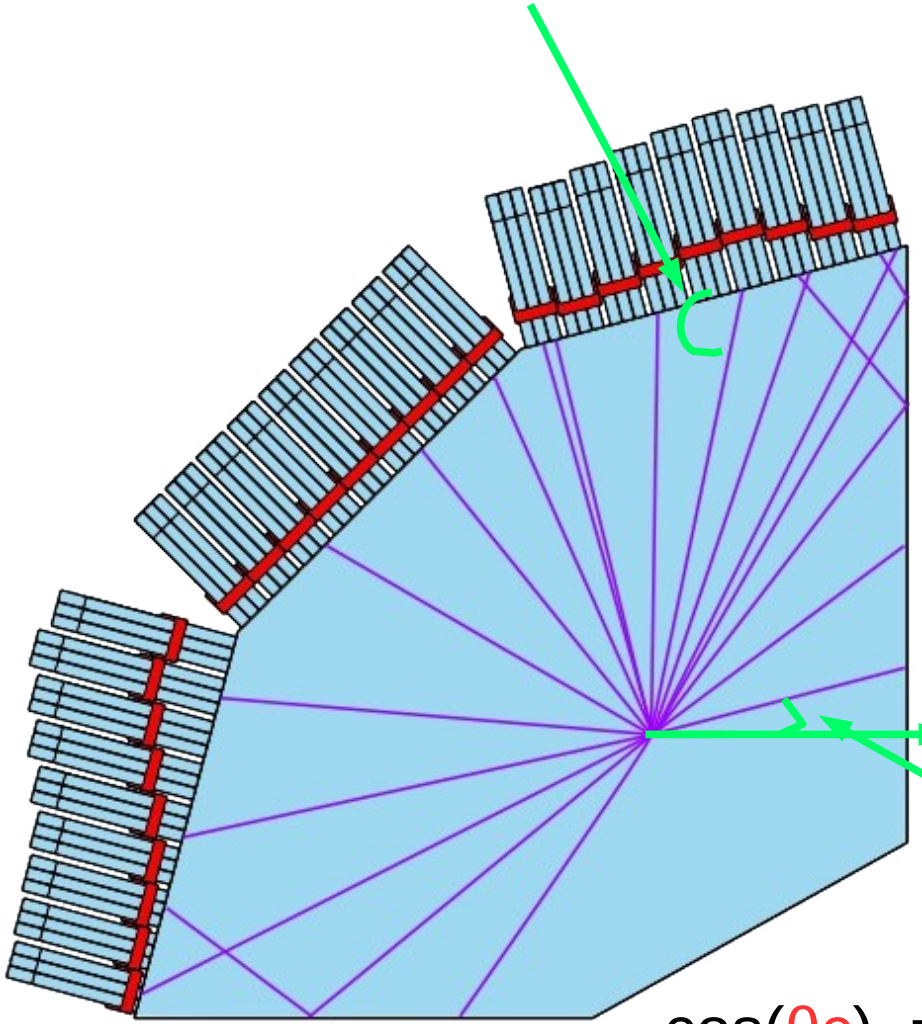
http://www.uni-giessen.de/fbz/fb07/fachgebiete/physik/einrichtungen/2pi/ag/ag-dueren

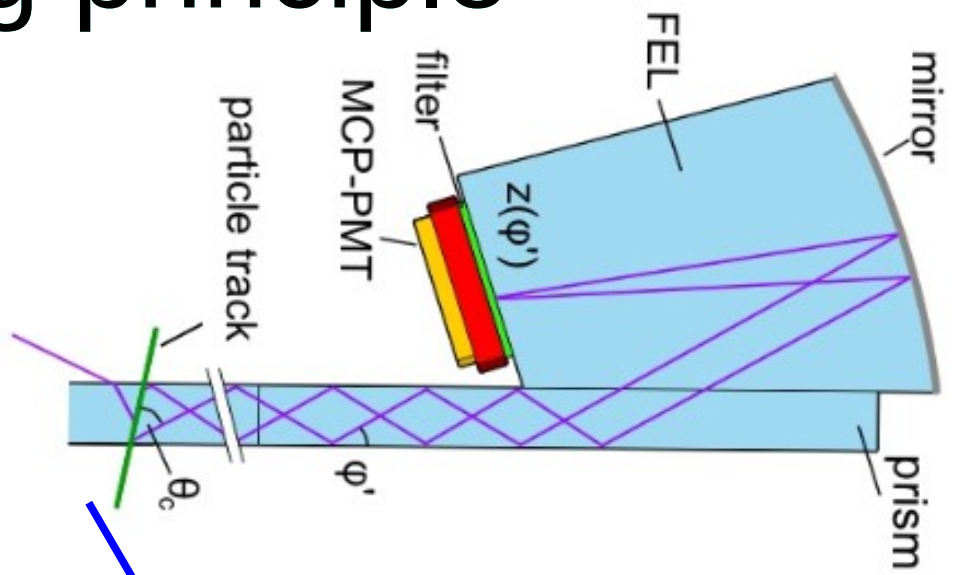


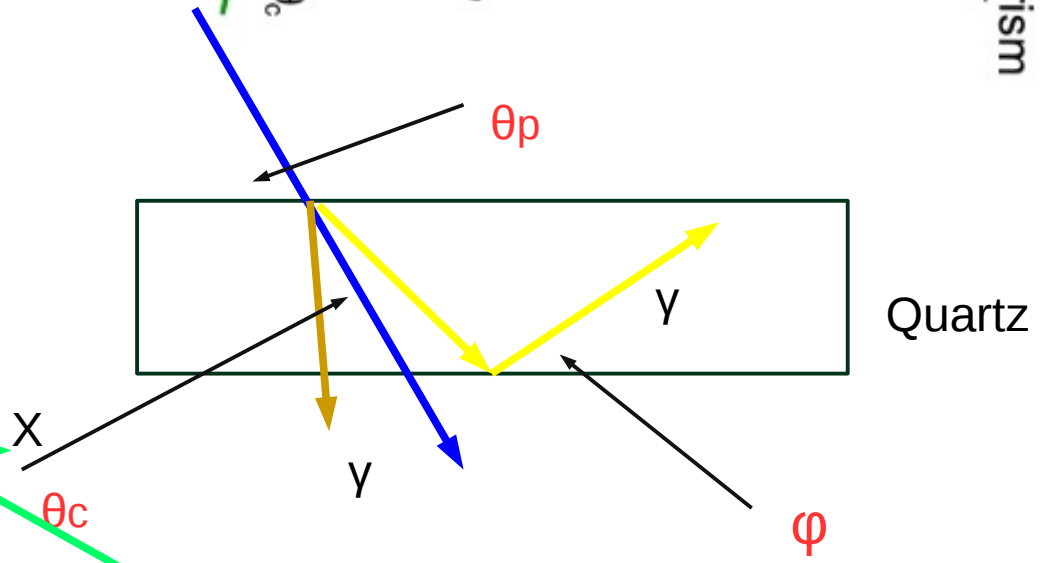


The working principle

$$\tan\varphi' = \frac{\tan\varphi}{\cos\alpha_{\mathrm{FEL}}}$$

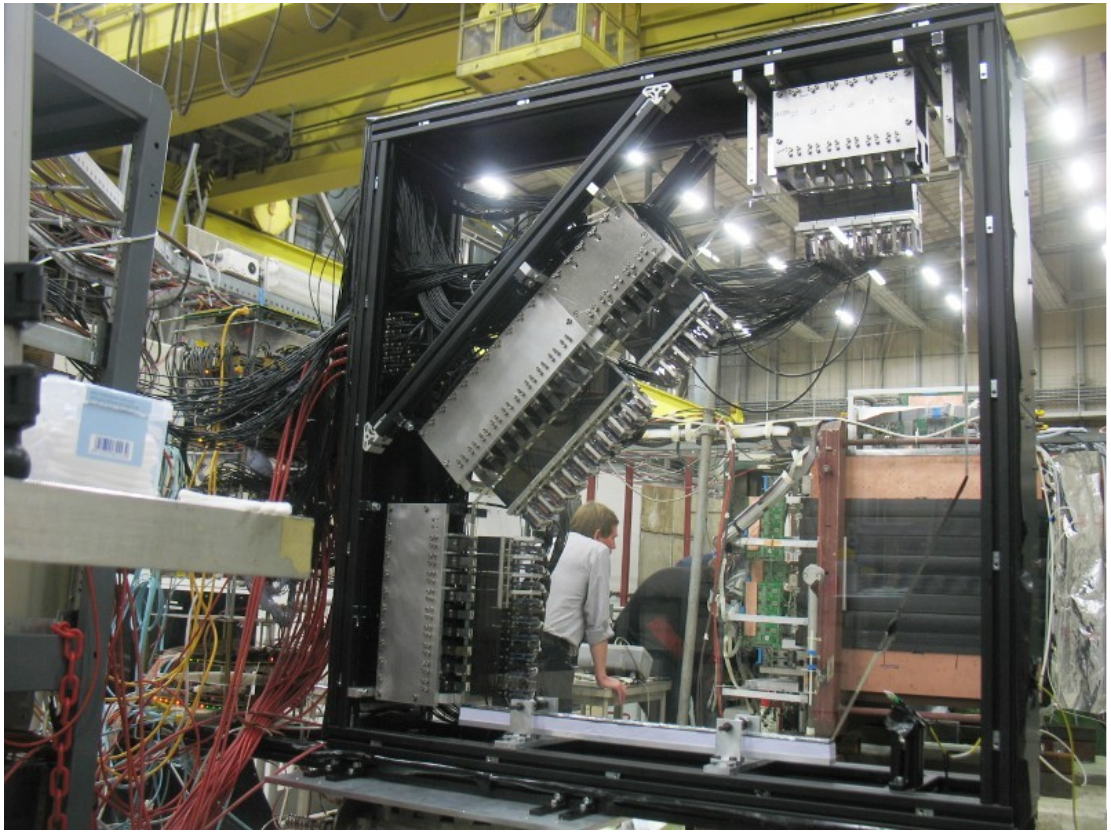


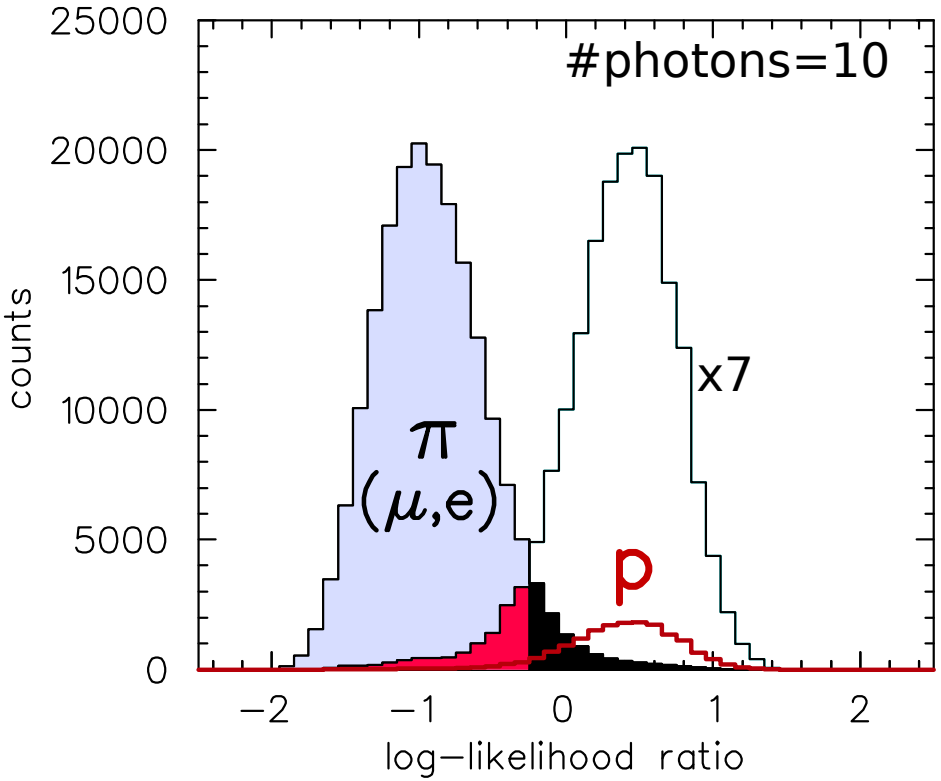




$$\cos(\theta c) = \sin(\theta p)\cos(\Phi)\cos(\varphi) + \cos(\theta p)\sin(\varphi)$$

The first full size EDD prototype(2012) tested at DESY and CERN already yield PID

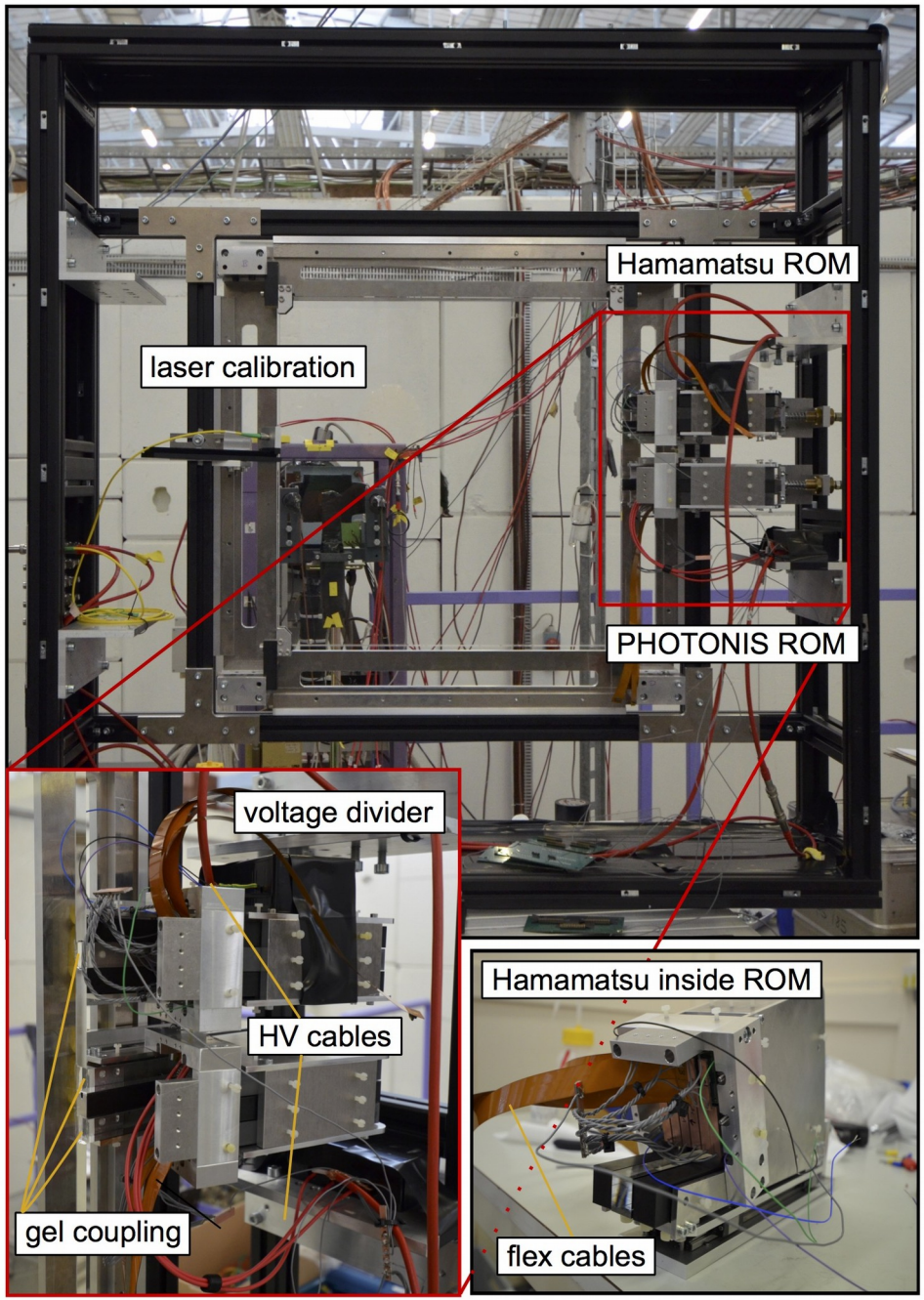


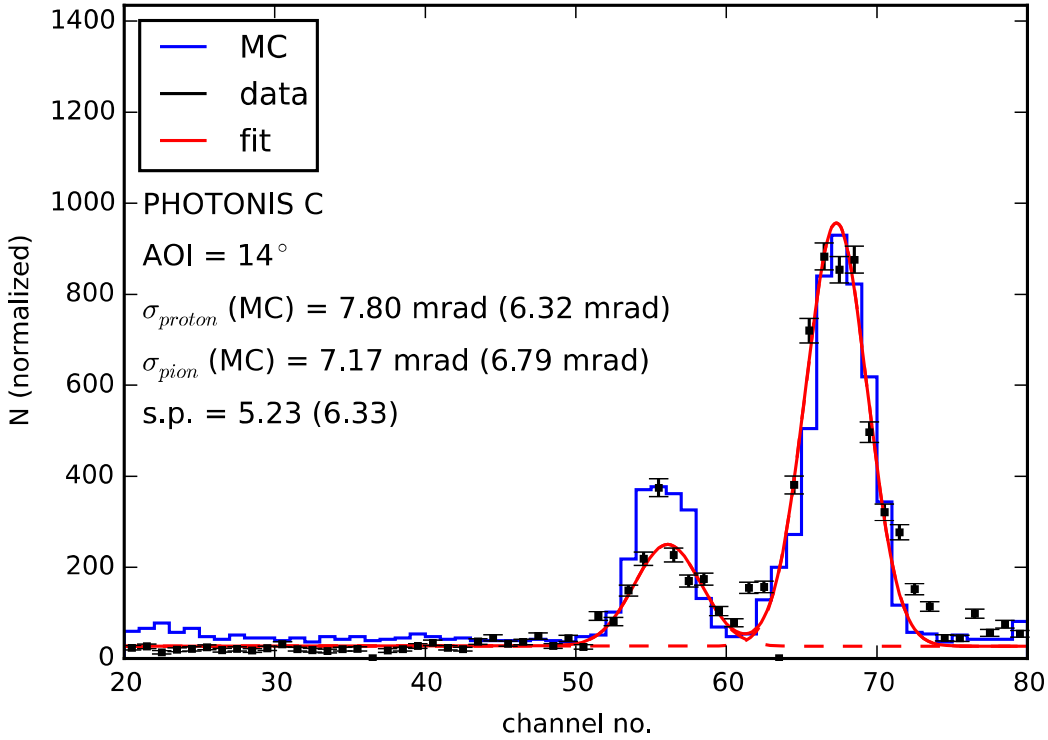


- radiator made of float glass
- FELs made of acrylic glass
- photo sensors: MA-PMT with 16 strips
- mixed hadron beam at CERN

Before bringing it to CERN the functionality of it was tested at DESY TB

Close to final design Prototype 2015@CERN



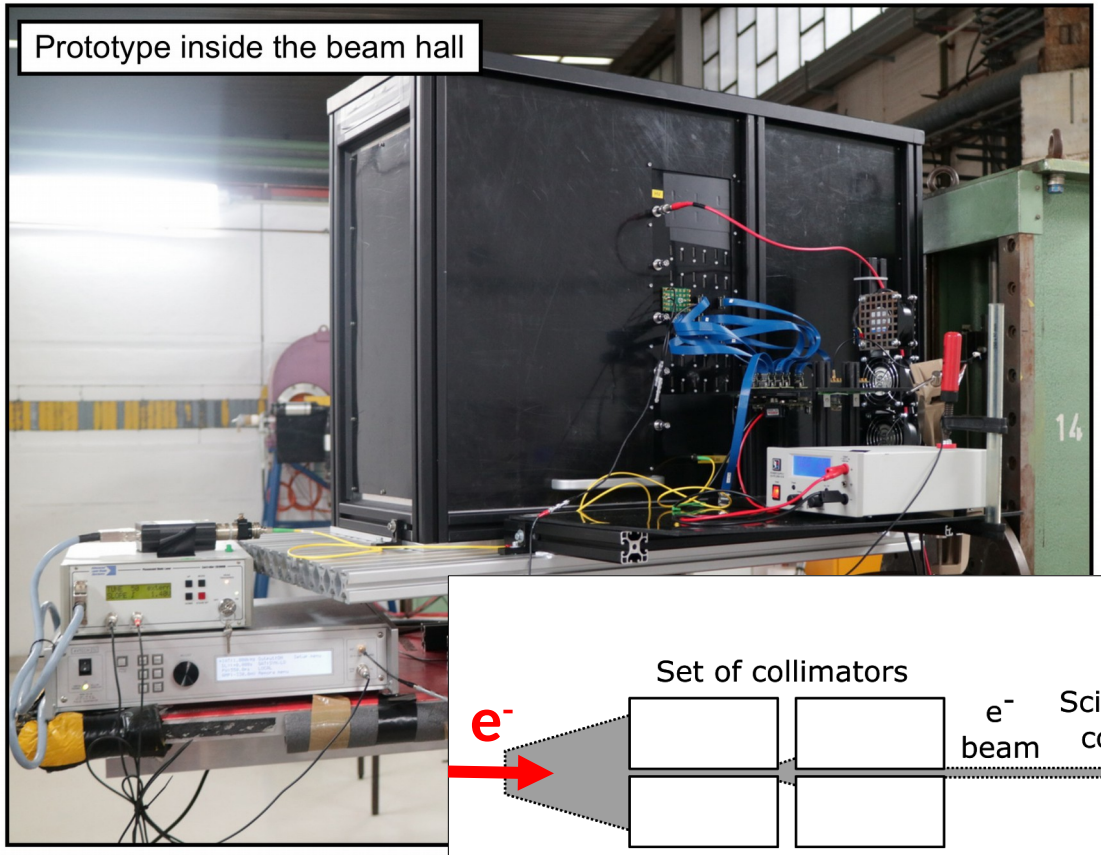


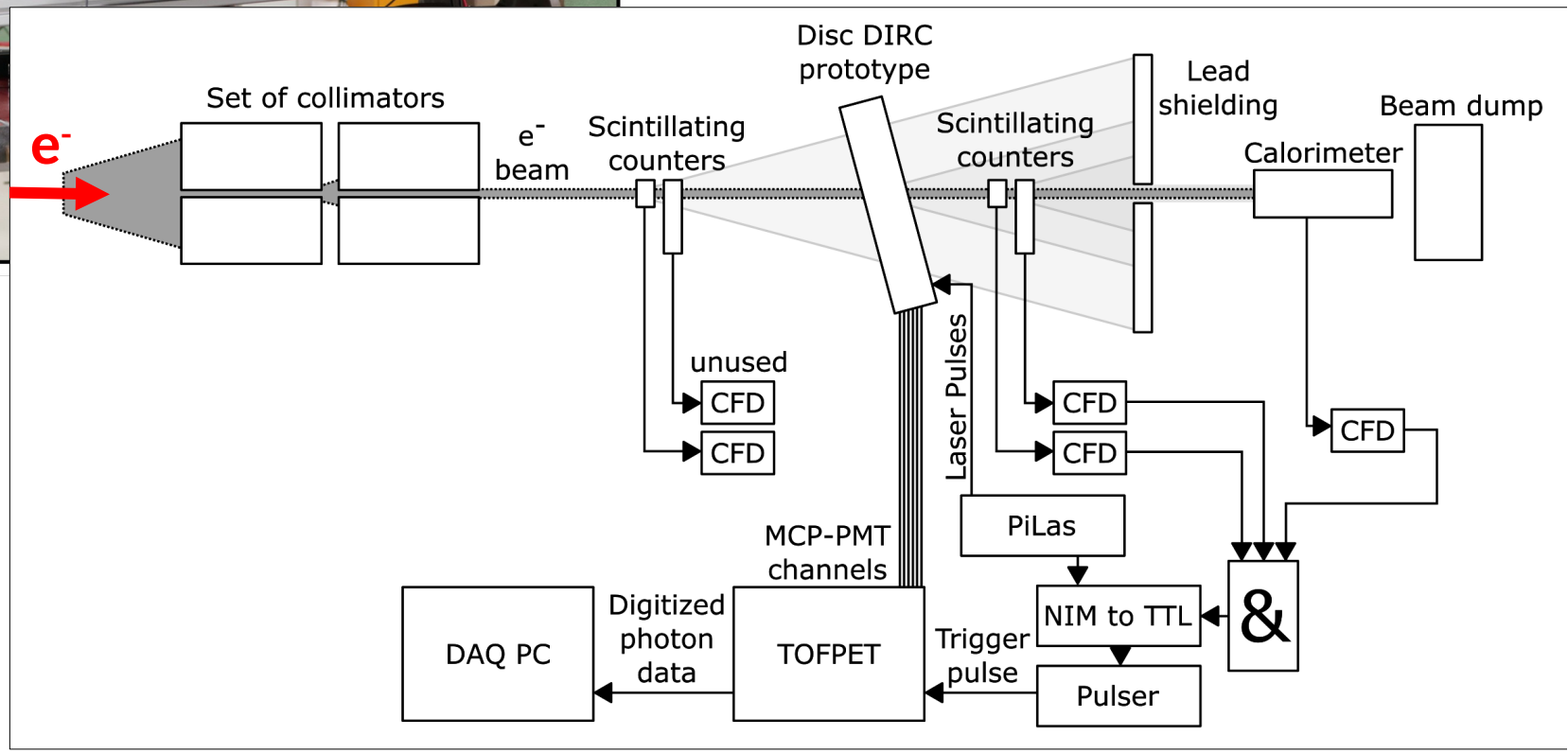
Radiator is now fused silica

Photon detector MCP-PMT 300 channel

Readout GSI TRB v3

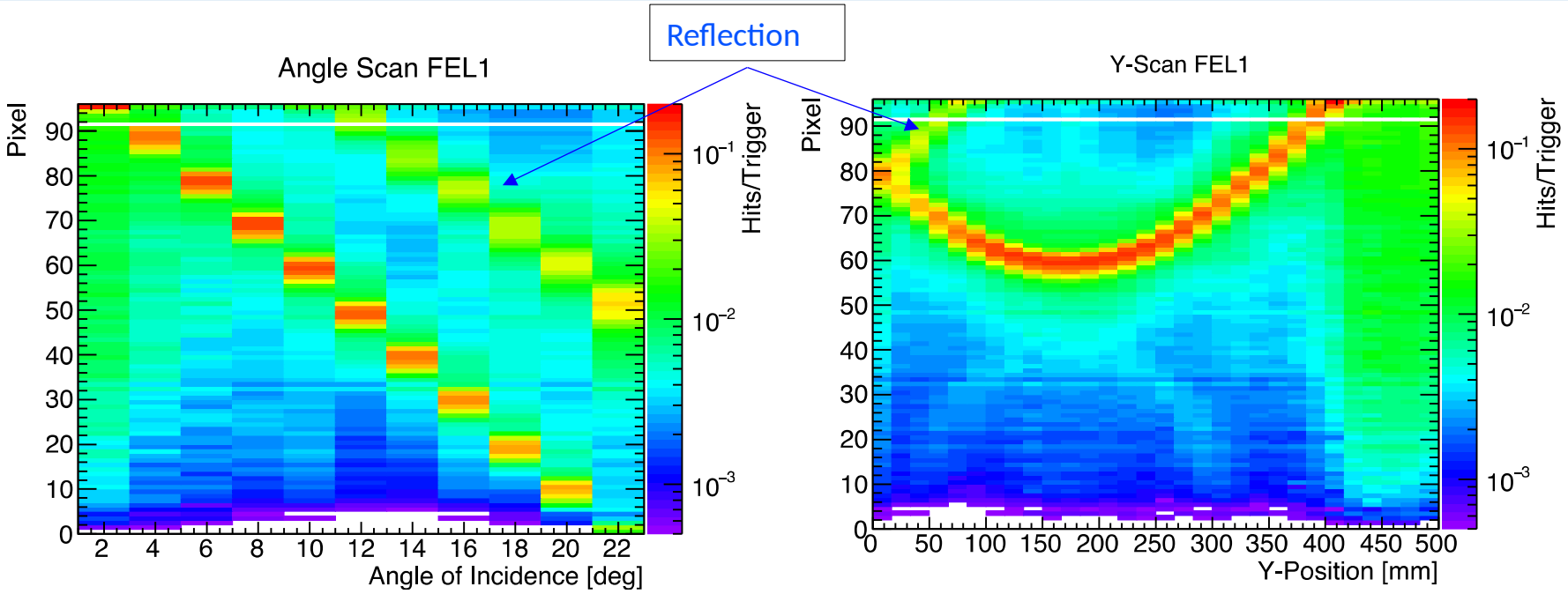
Upgraded ToFPET readout on DESY TB line 2016



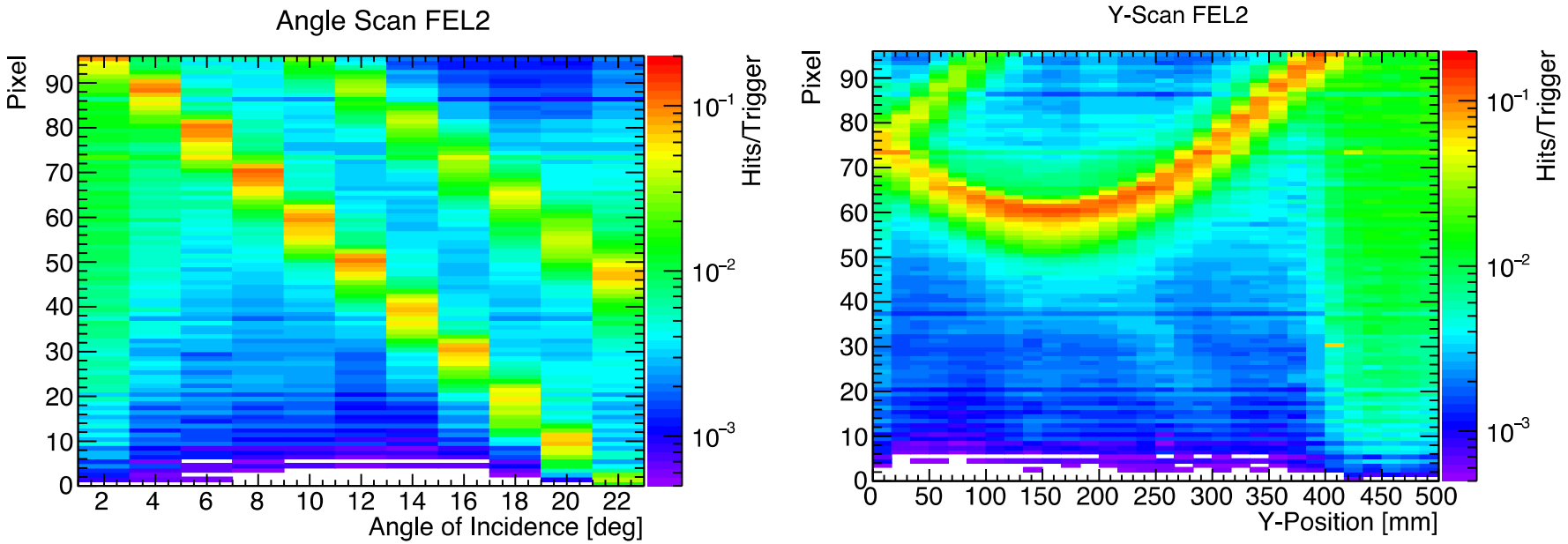


Angle and position scan (2016)

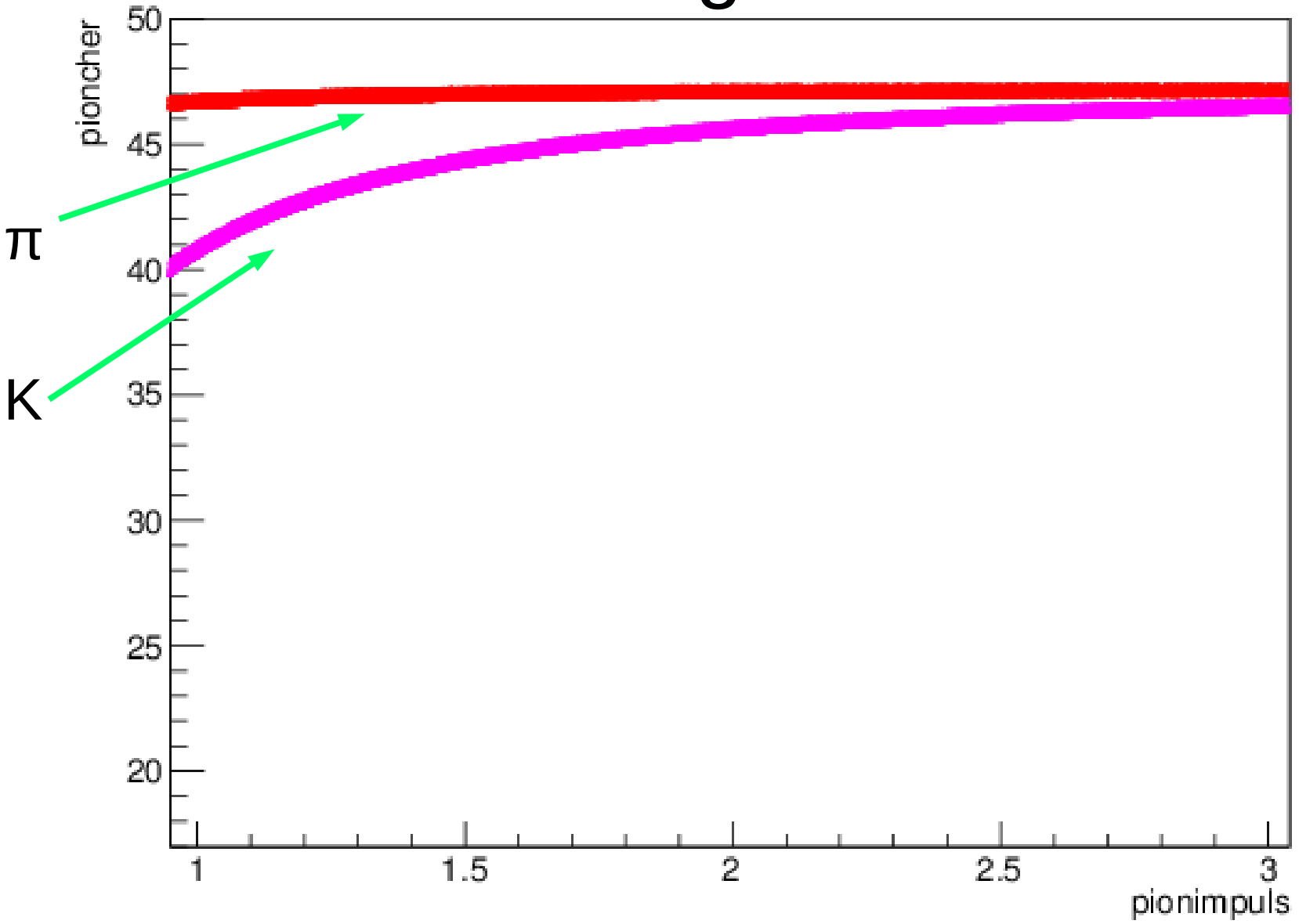
FEL 1



FEL 2

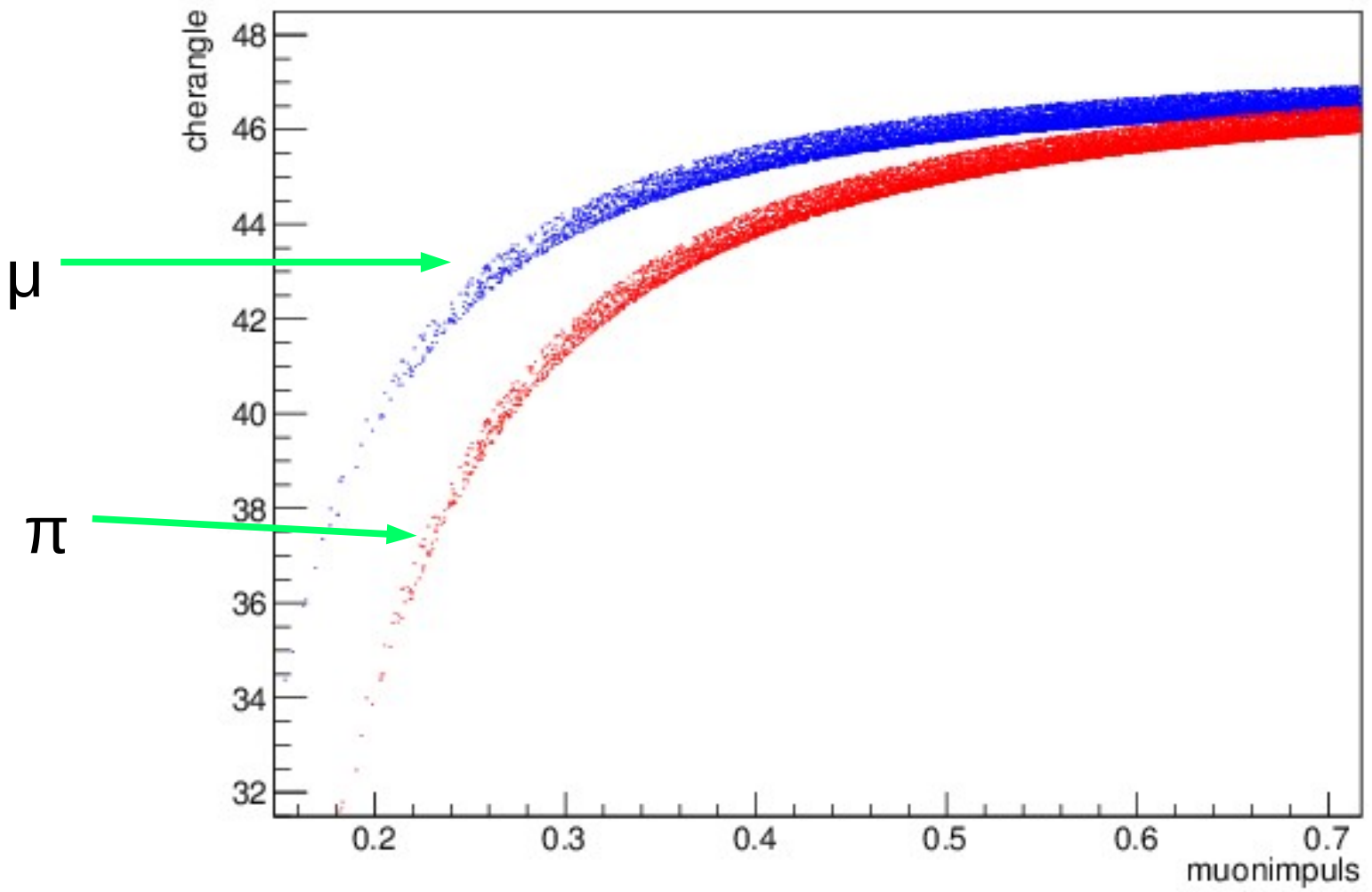


Pion-Kaon separation at PANDA
Cherenkov angle vs momentum



The Cherenkov photon angle inside our radiator fused silica(n~1.47) for kaons and pions

TB wishes π/μ mixture?



Impuls GeV/c

It will mimic the Kaon/Pion situation for the momentum range one need for PANDA

Thanks/Wishes

- We would like to Thank once more DESY TB conveners:

  R.Diener, N.Meyners, M.Stanitzki, N.Potylitsina-Kube

  and staff for excellent environment we get here for our past/future campaigns
- A mixed pion/muon beam would be useful for our DIRC development, e. g. $p \approx 500$ MeV/c
- Another wish is to have multichannel DAQ system available to readout PMT's, MCP-PMT's, etc. (e.g. waveform sampling based)