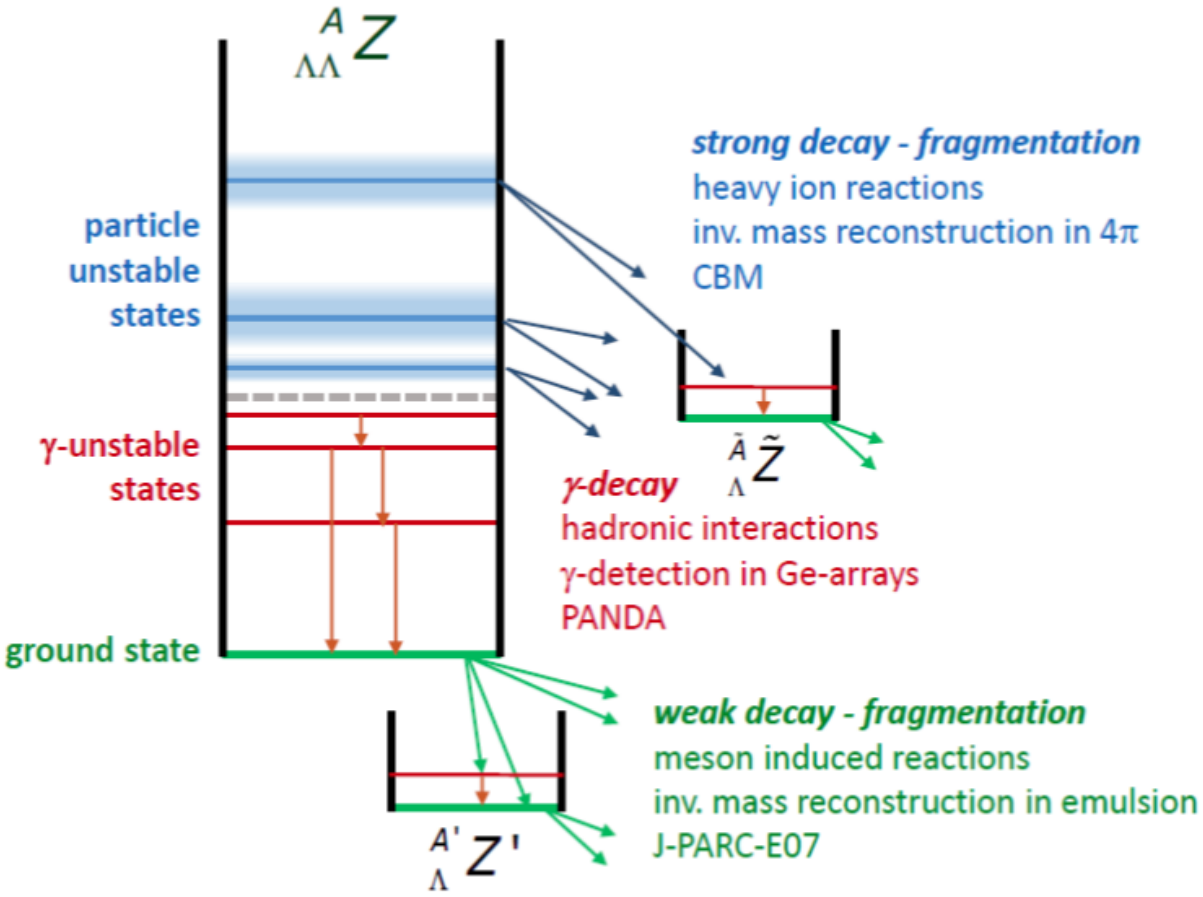
The $\bar{P}$anda Hypernuclei Experiment

Michael Bölting

HIM HELMHOLTZ Helmholtz-Institut Mainz

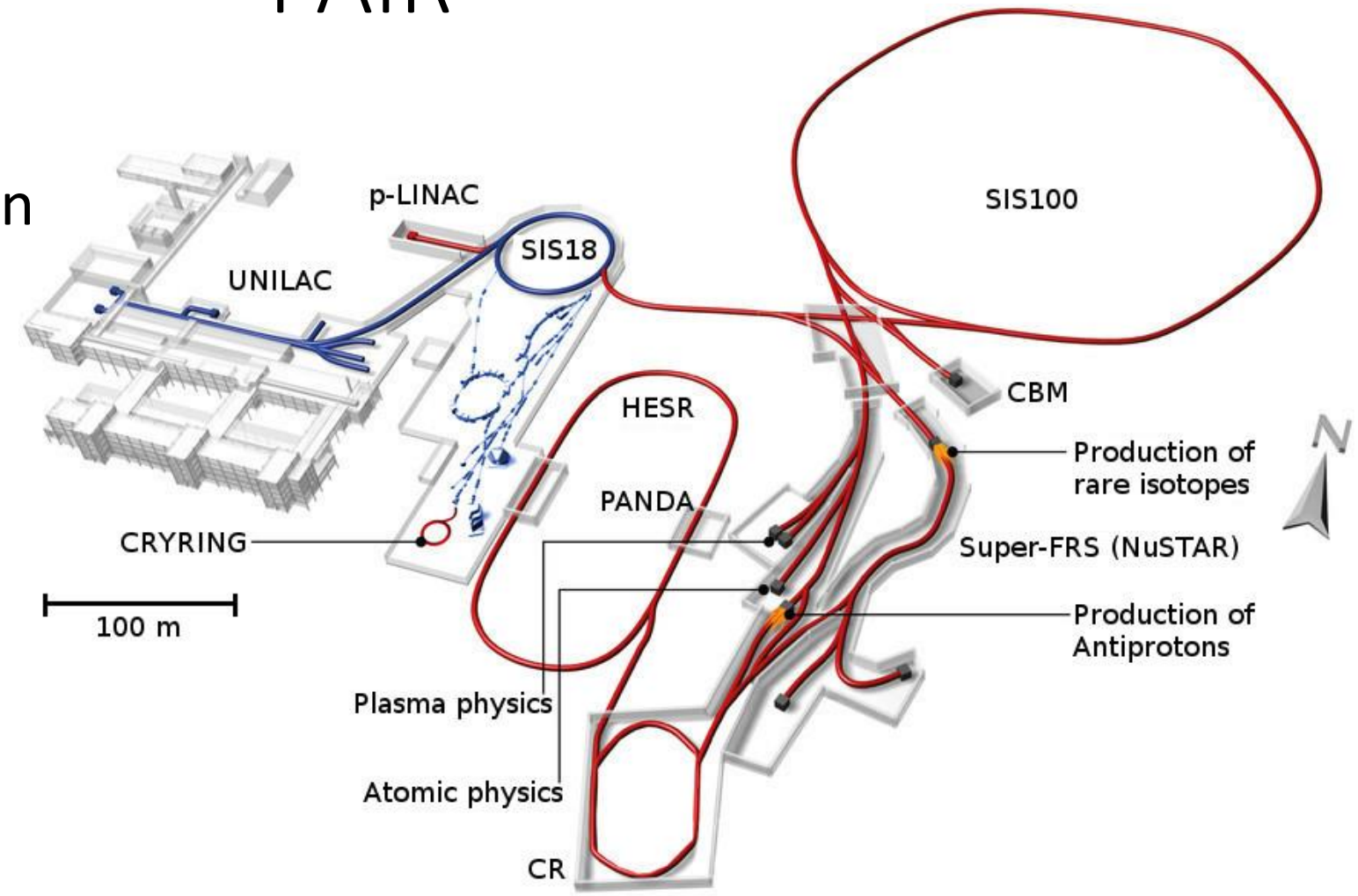
SNP School 2017, Tōkai, December 2017

Strangeness Physics Experiments



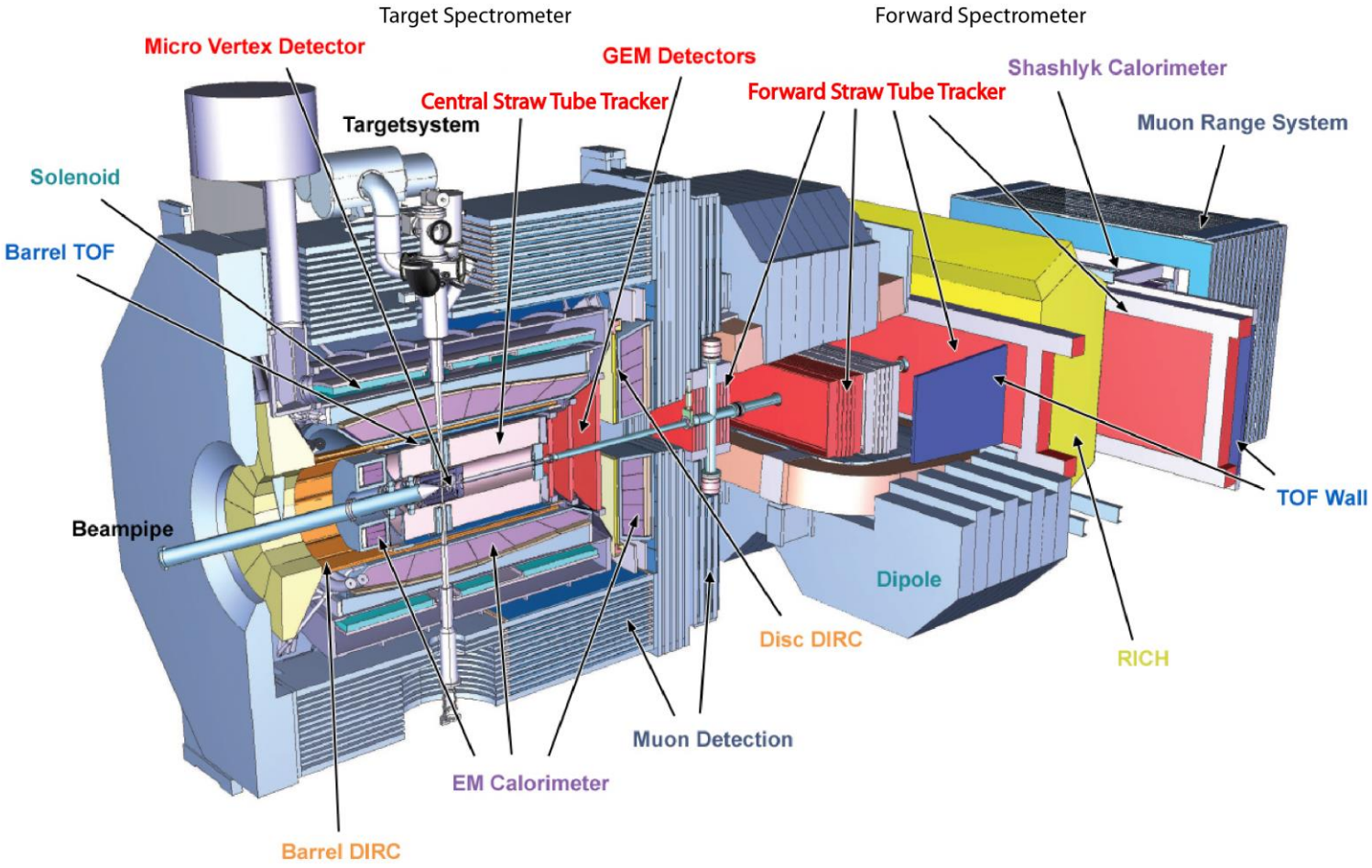
FAIR

- Facility for Antiproton and Ion Research
- Future accelerator centre at GSI
- HSR beam energy 1.5 GeV – 9 GeV



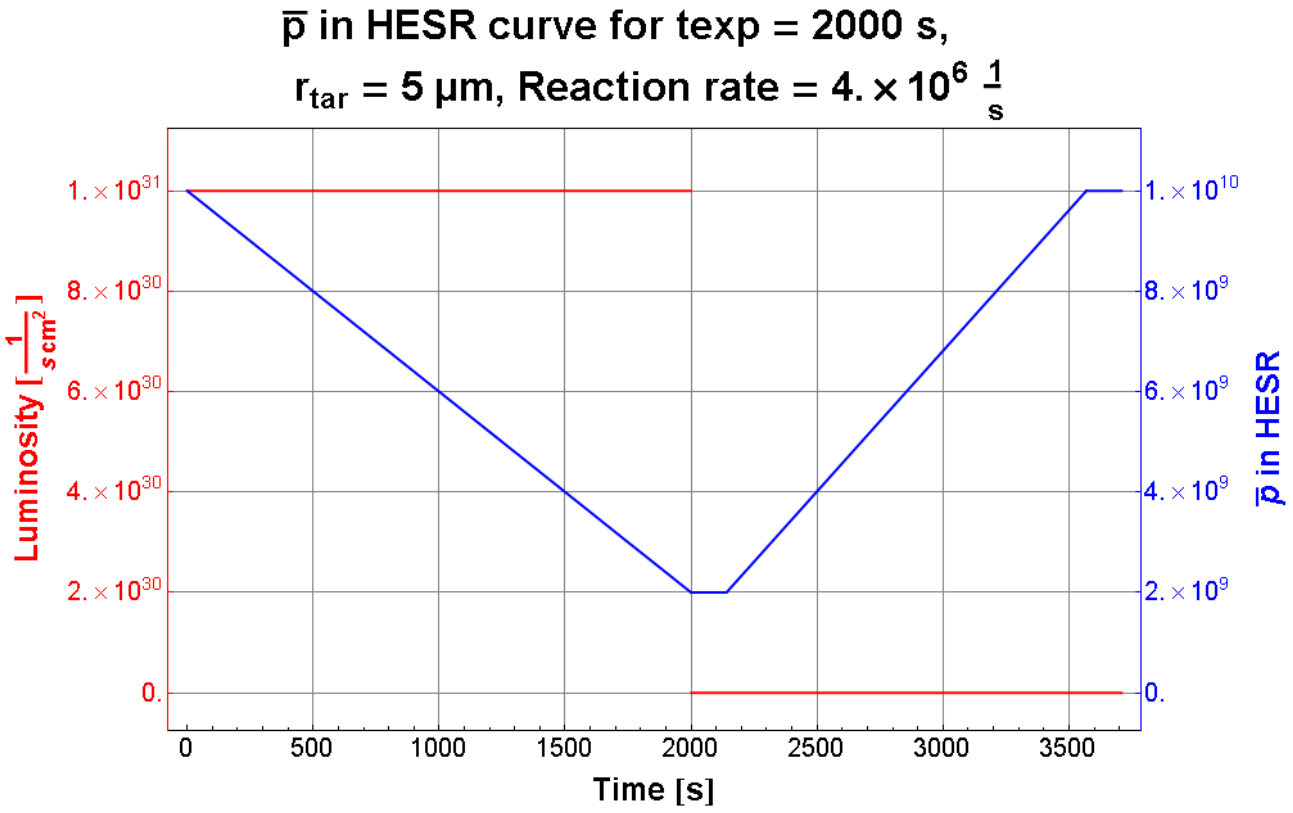
$\bar{P}$anda

- Antiproton Annihilation at Darmstadt
- Modular Detector
- Fixed Target

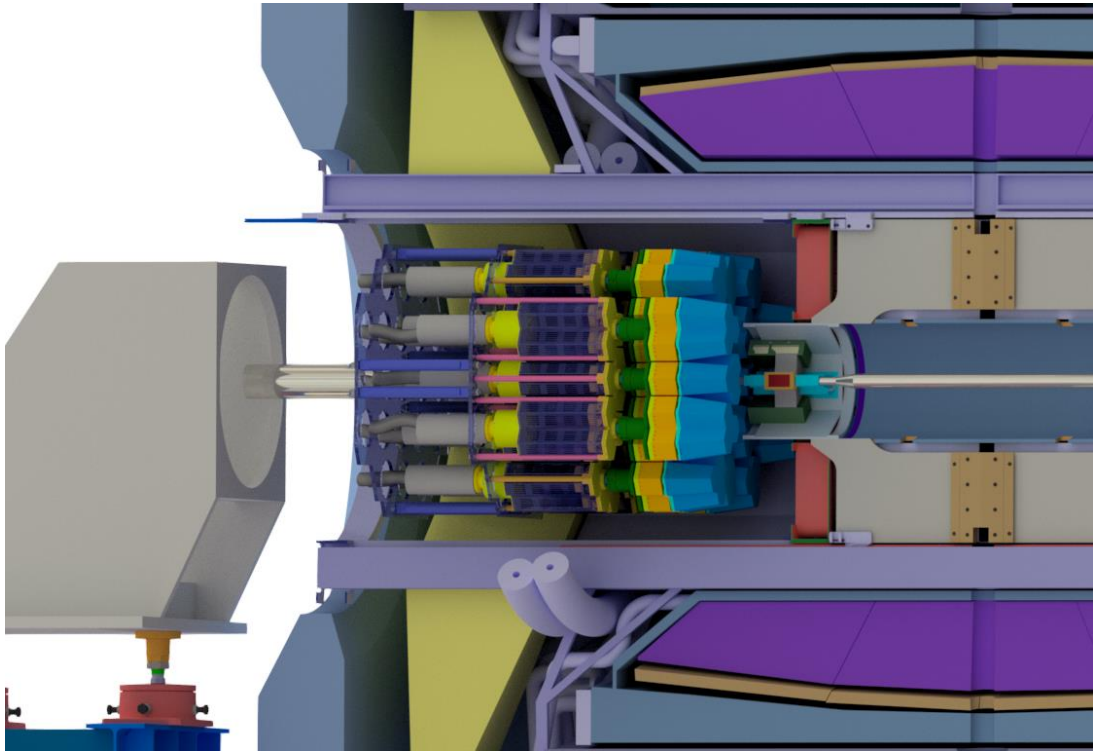


HESR: High Energy Storage Ring

- Beam energy 3 GeV
- $N_{beam} \neq const$
- Fill time ~ 20 min
- Thin target



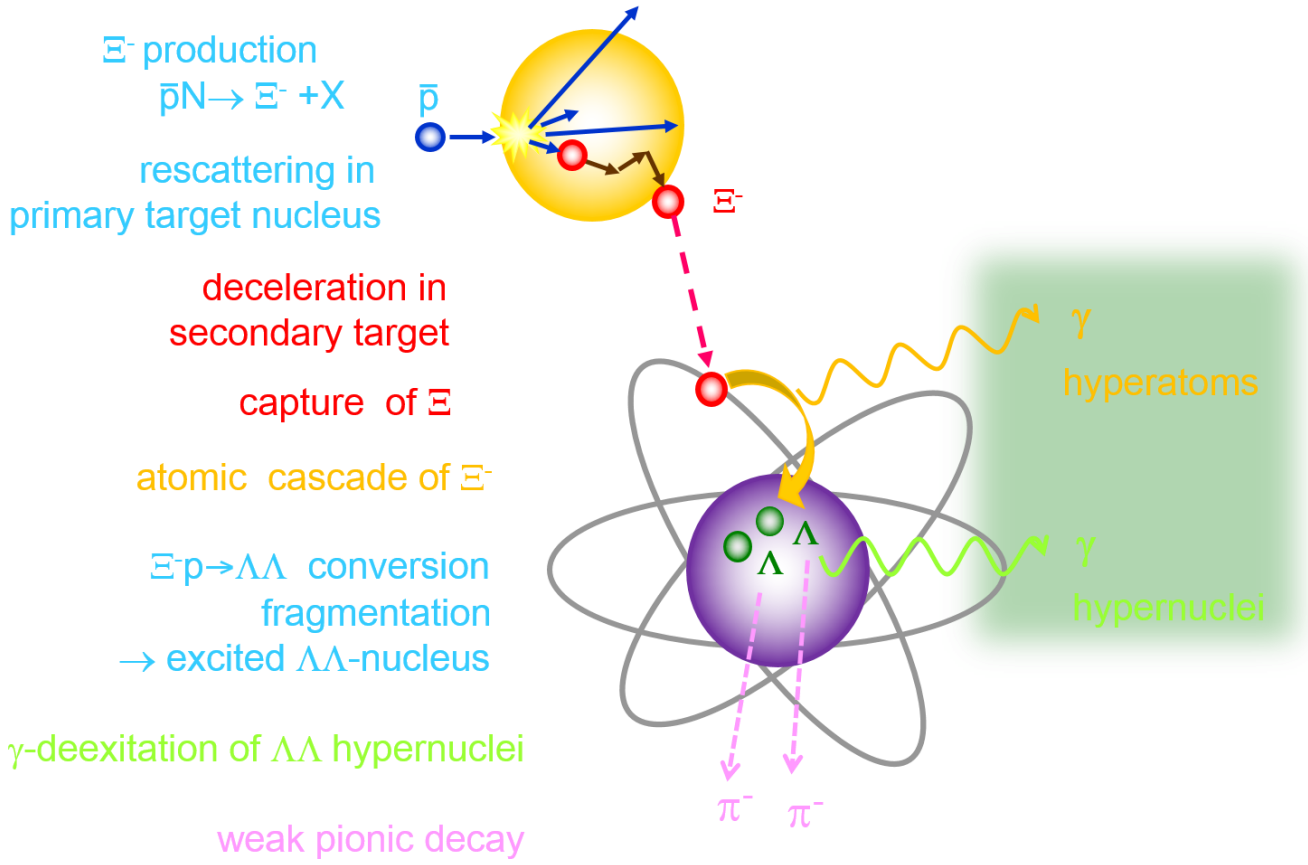
Experimental setup for the hypernuclei experiment



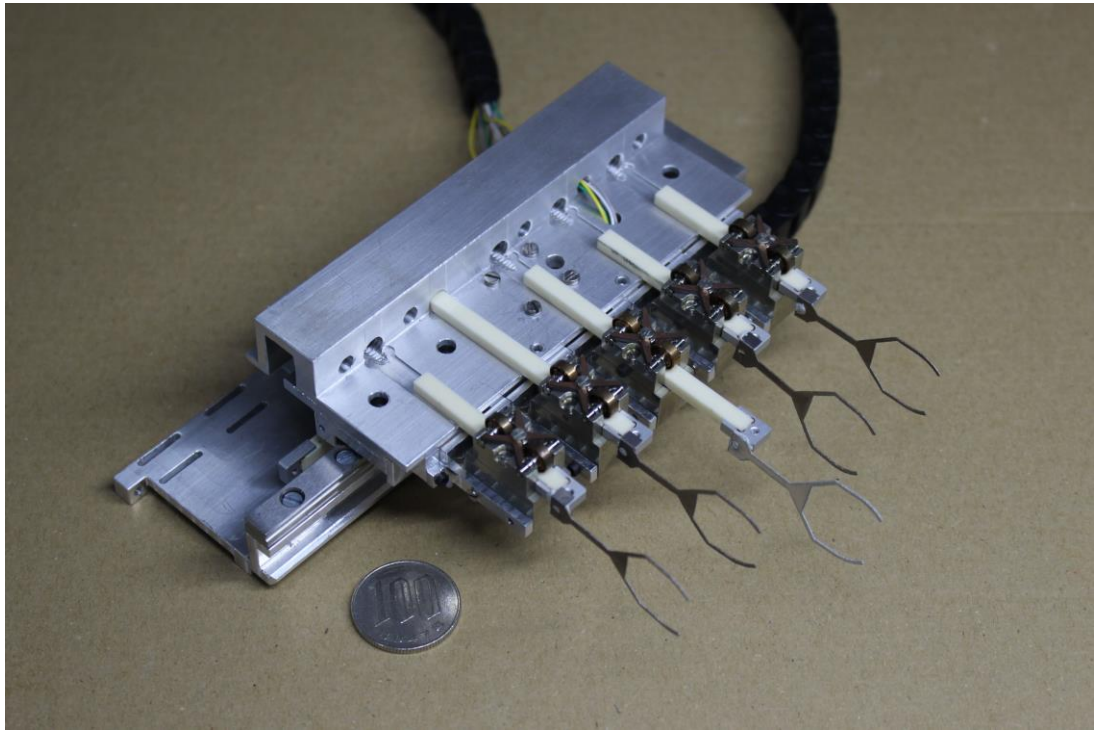
- Remove inner detector components
- Insert dedicated target system
- Replace electromagnetic calorimeter by PANGEA

Production of Hypernuclei

Insgesamt dunkler machen für mehr Kontrast!



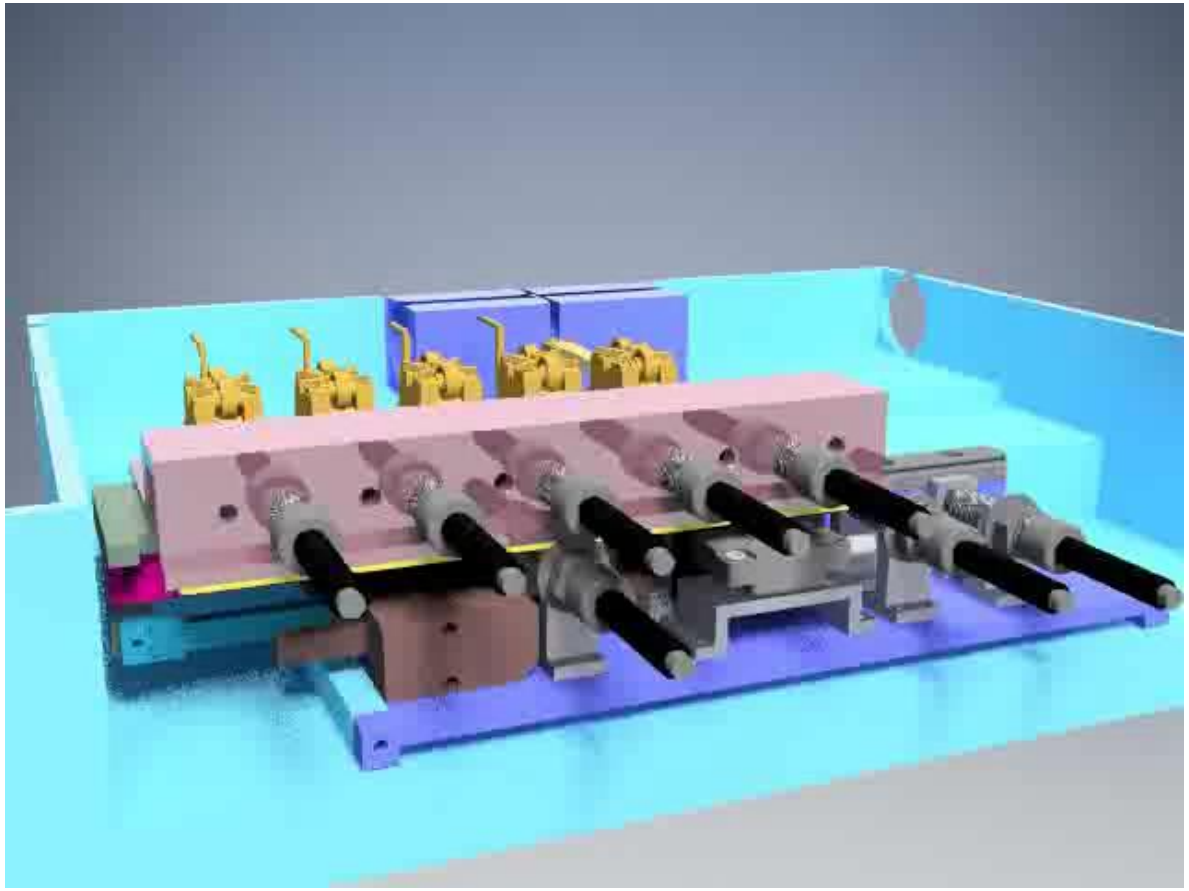
Primary Target



- Radiation hard
- Vacuum rated
- Magnetic field
- Piezo motors

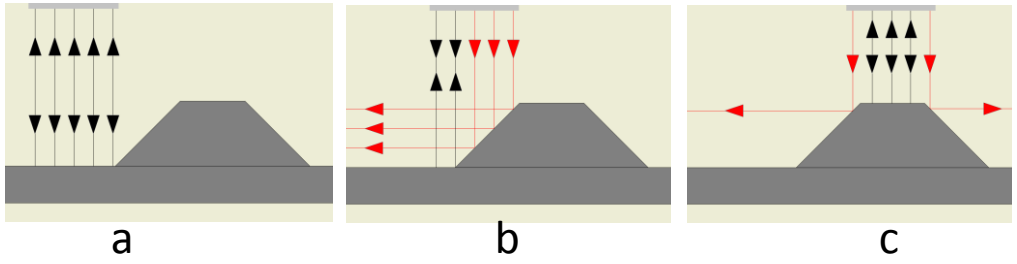
- Details: Poster by F. Schupp

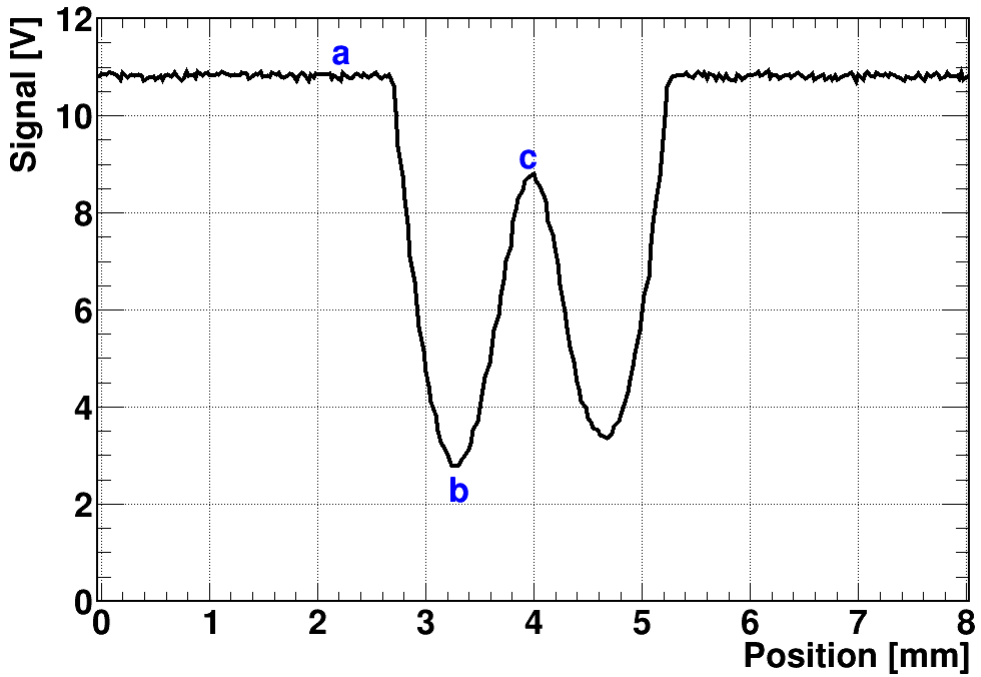
Primary Target Control along beam axis



- Target replacement
- Non-electronic position control

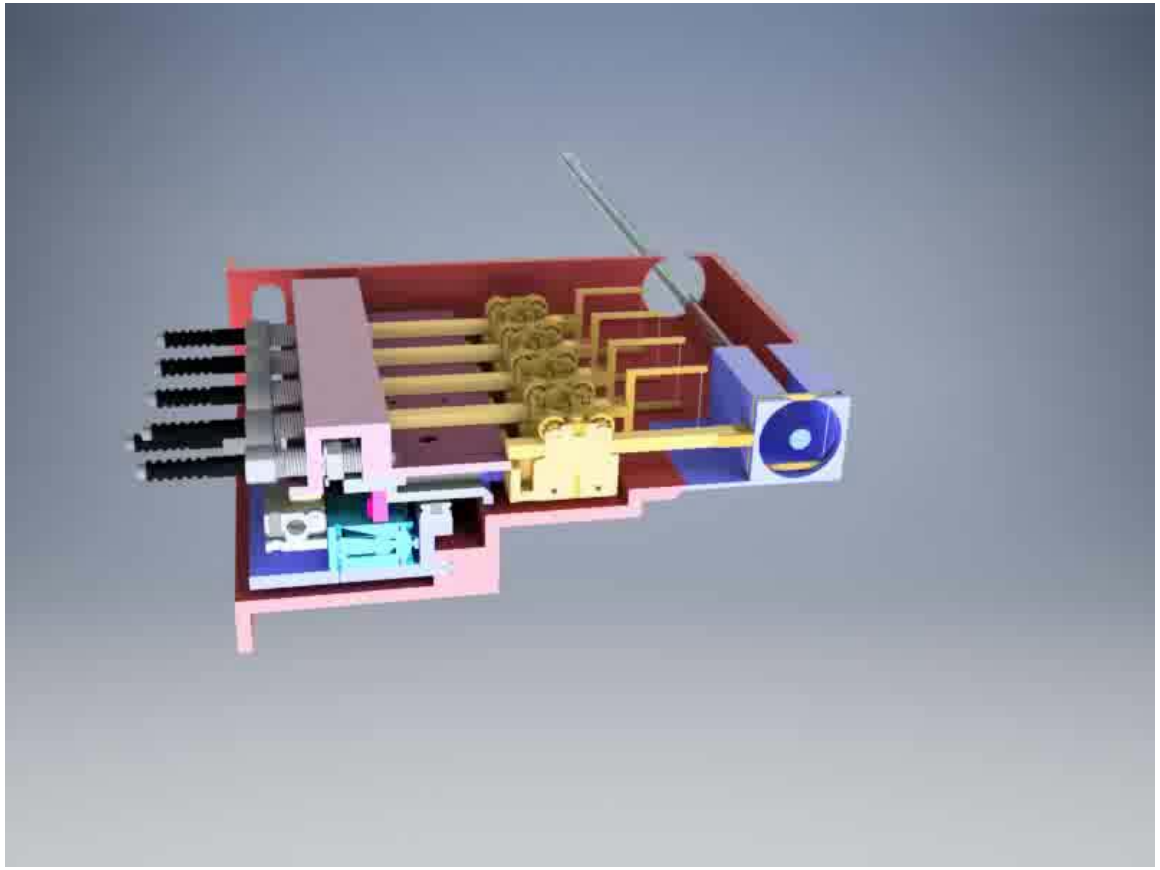
Positioning along beam axis





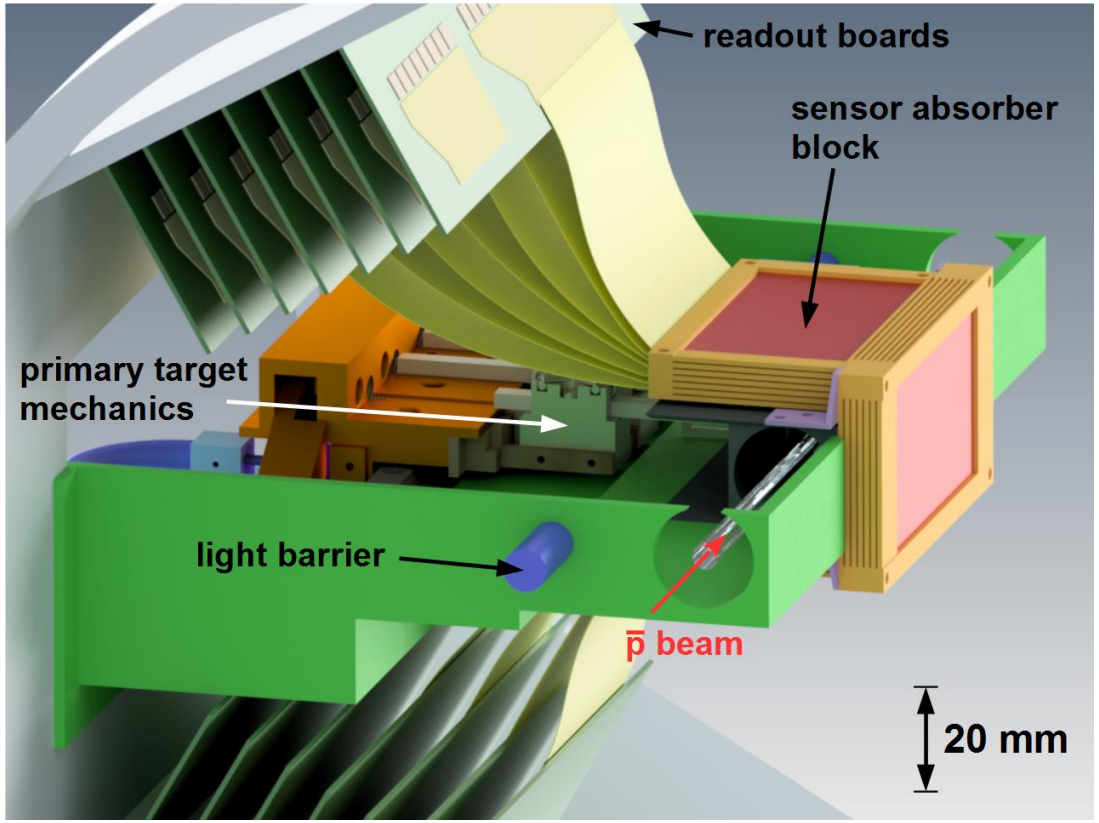
- 50 µm Resolution

Positioning perpendicular to beam axis

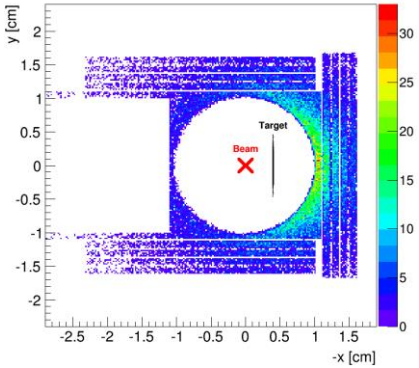


- In halo of beam
- Rate: $n \propto N_{beam} \times N_{target}$
- Storage Ring: $N_{beam} \neq const$
- Move target for constant luminosity

Secondary Target

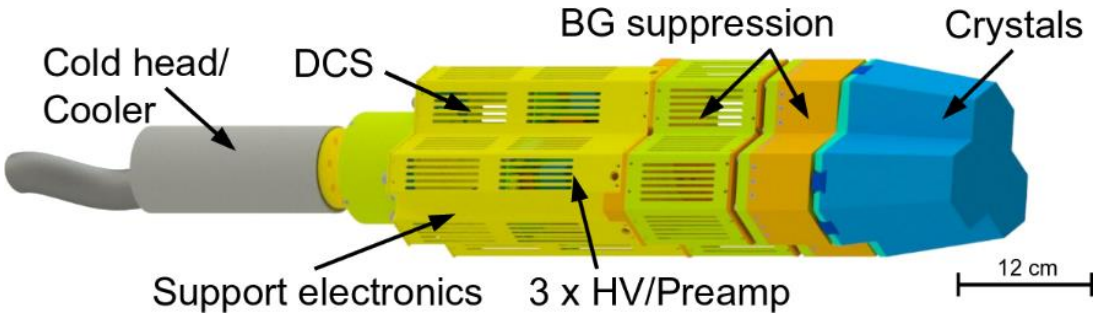


- Sandwich structure
  - 4 layers boron
  - 7 layers silicon strip detectors
- Stopping and capture of Ξ^-
- Formation of hypernuclei
- Detection of weak decay pions

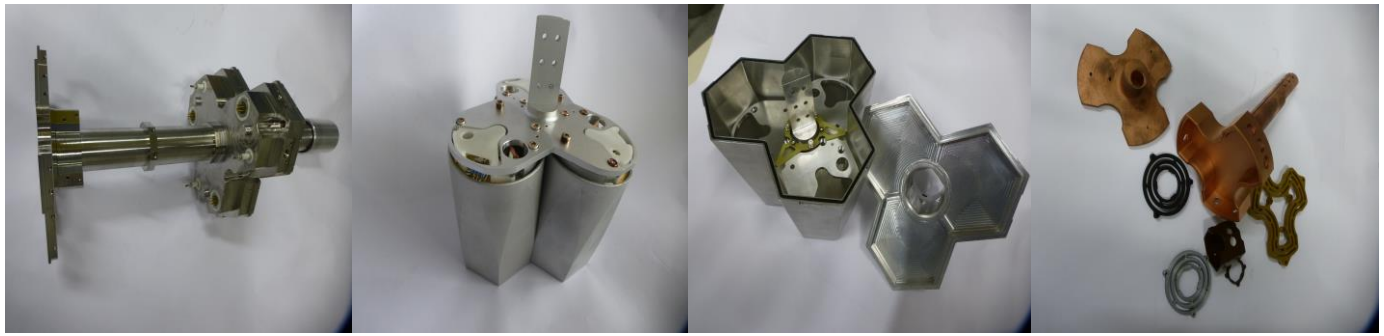


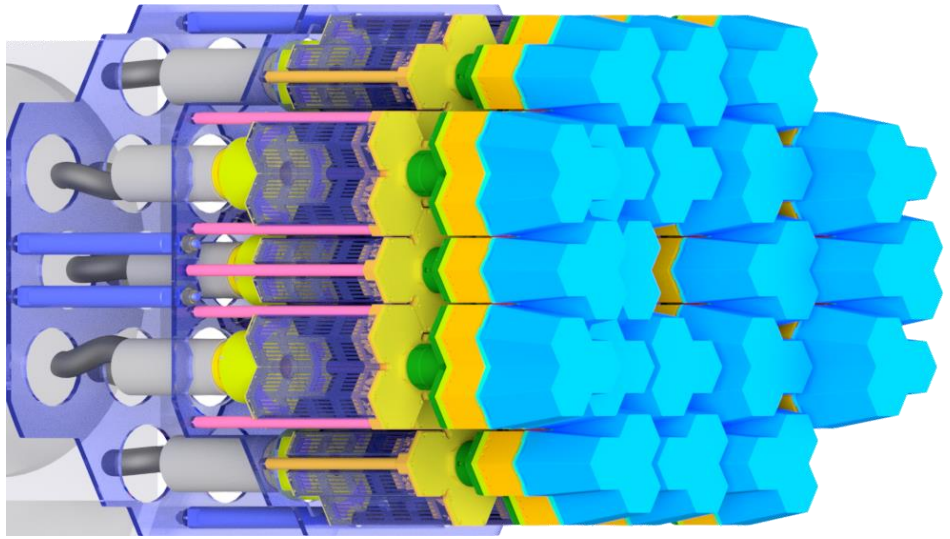
PANGEA: PANda Germanium Array

- Germanium detector
- 20 triple cluster
- Highly integrated detectors
- Electromechanic cooling



- Details: Poster





Outlook

- Further optimization
- Construction of Components
- 2025: First beam of FAIR