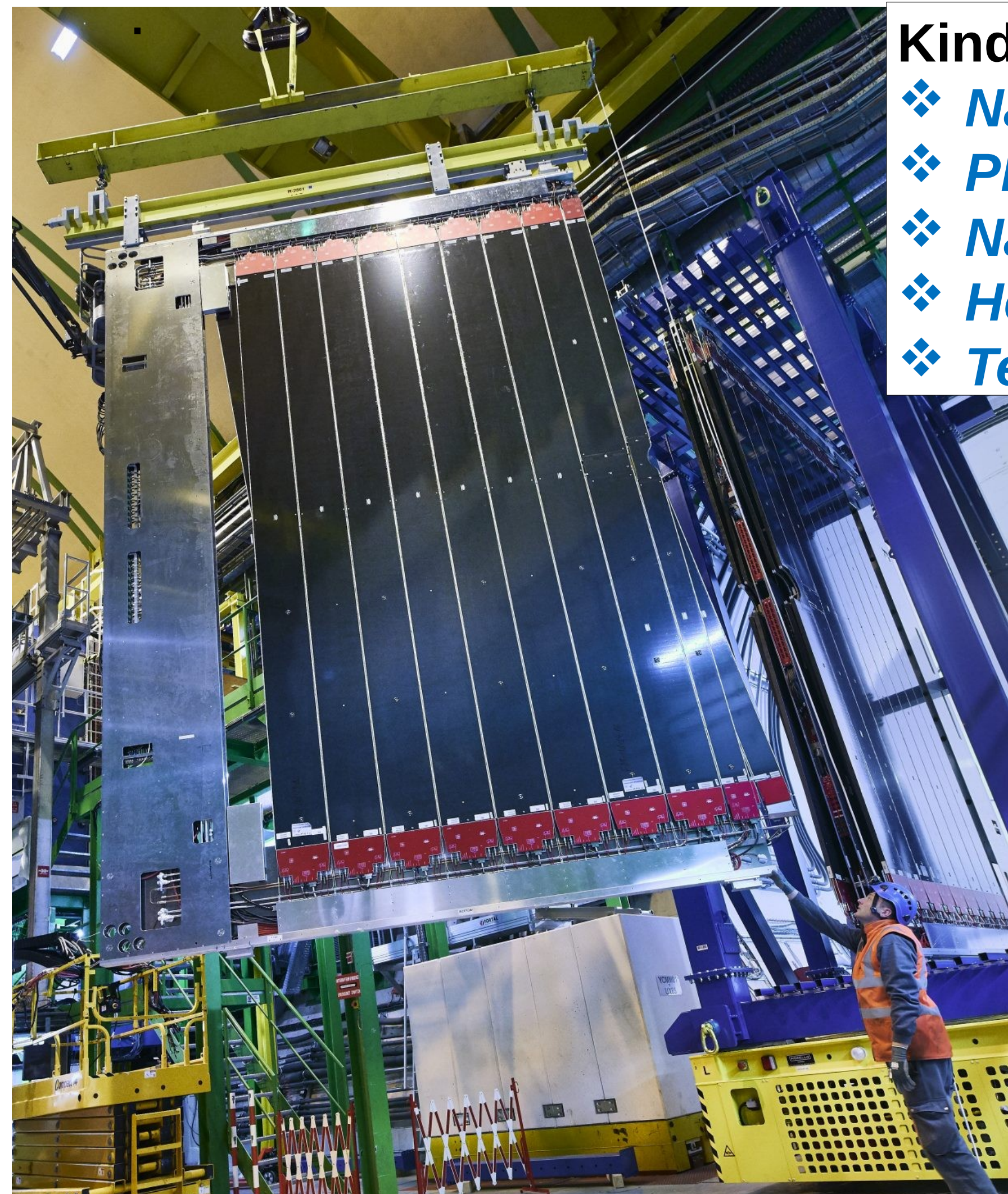


Future missions of the former LHCb Outer Tracker gaseous detector

LHCb/CERN donated the formidable Outer Tracker straw tube detector to GSI for further use in experiments at GSI, the Facility for Antiproton and Ion Research (FAIR) and predominantly in PANDA, the anti-Proton ANnihilation in DArmstadt.



Kind donation by LHCb groups who meticulously built the Outer Tracker straw tube detector

- ❖ National Institute for Subatomic Physics, Nikhef, The Netherlands
- ❖ Physikalisches Institut der Universität Heidelberg, Germany
- ❖ National Center for Nuclear Research, Warsaw, Poland
- ❖ Henryk Niewodniczanski Institute of Nuclear Physics, Polish Academy of Sciences, Krakow, Poland
- ❖ Technische Universität Dortmund, Germany



OT - Detector transport (3.5 x 5.2 x 7)m³, 24t on trucks & a boat from CERN to GSI, 5 days

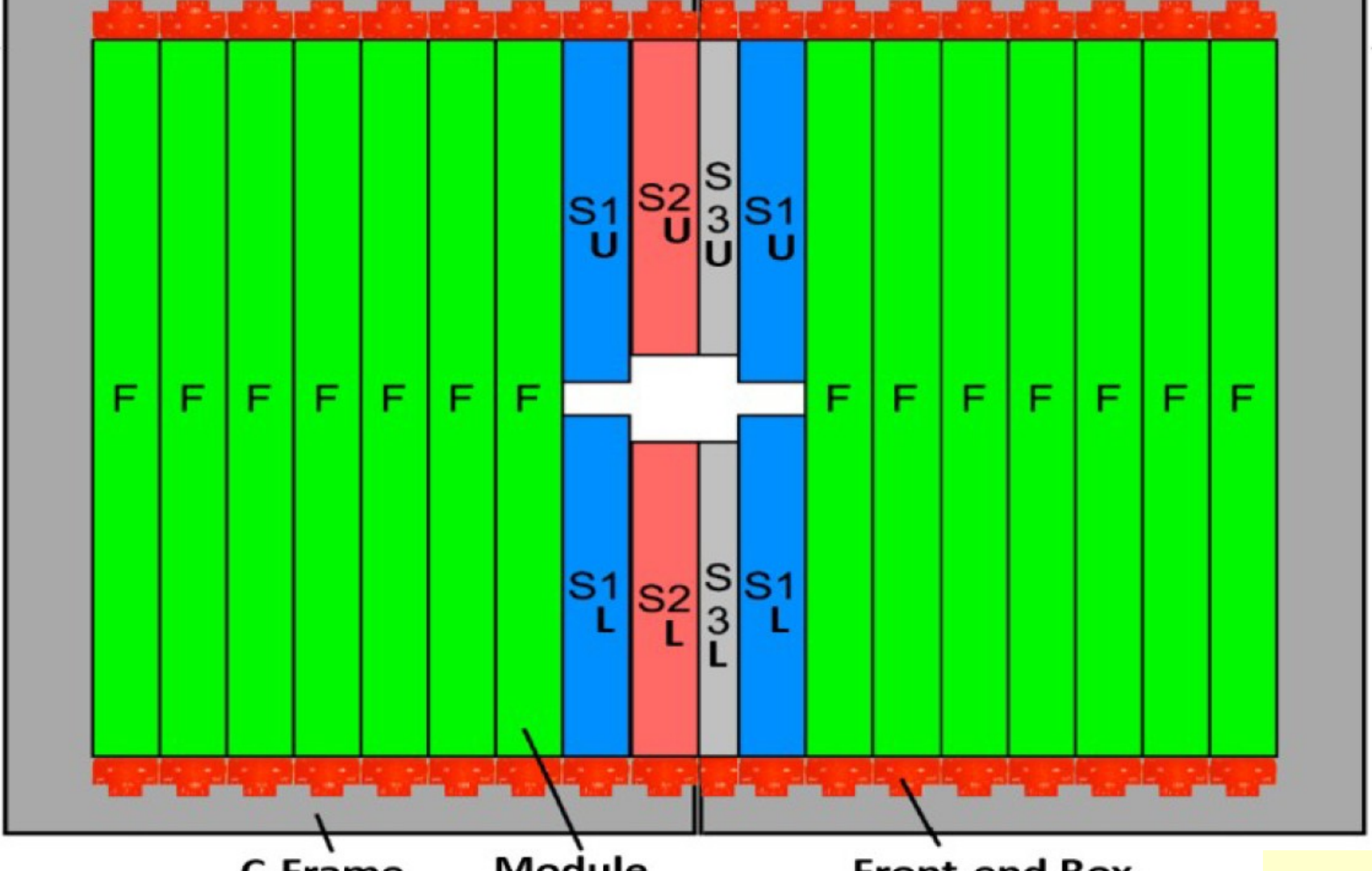


OT one of 12 frames, (5x6)m², with 4352 straws in 18 modules (Photo: LHCb)

OT departure @ CERN - Team transport & logistics, LHCb & PANDA (Photo: LHCb/CERN)

OT arrival at GSI / FAIR - PANDA Technical Coordination Group (Photo:GSI)

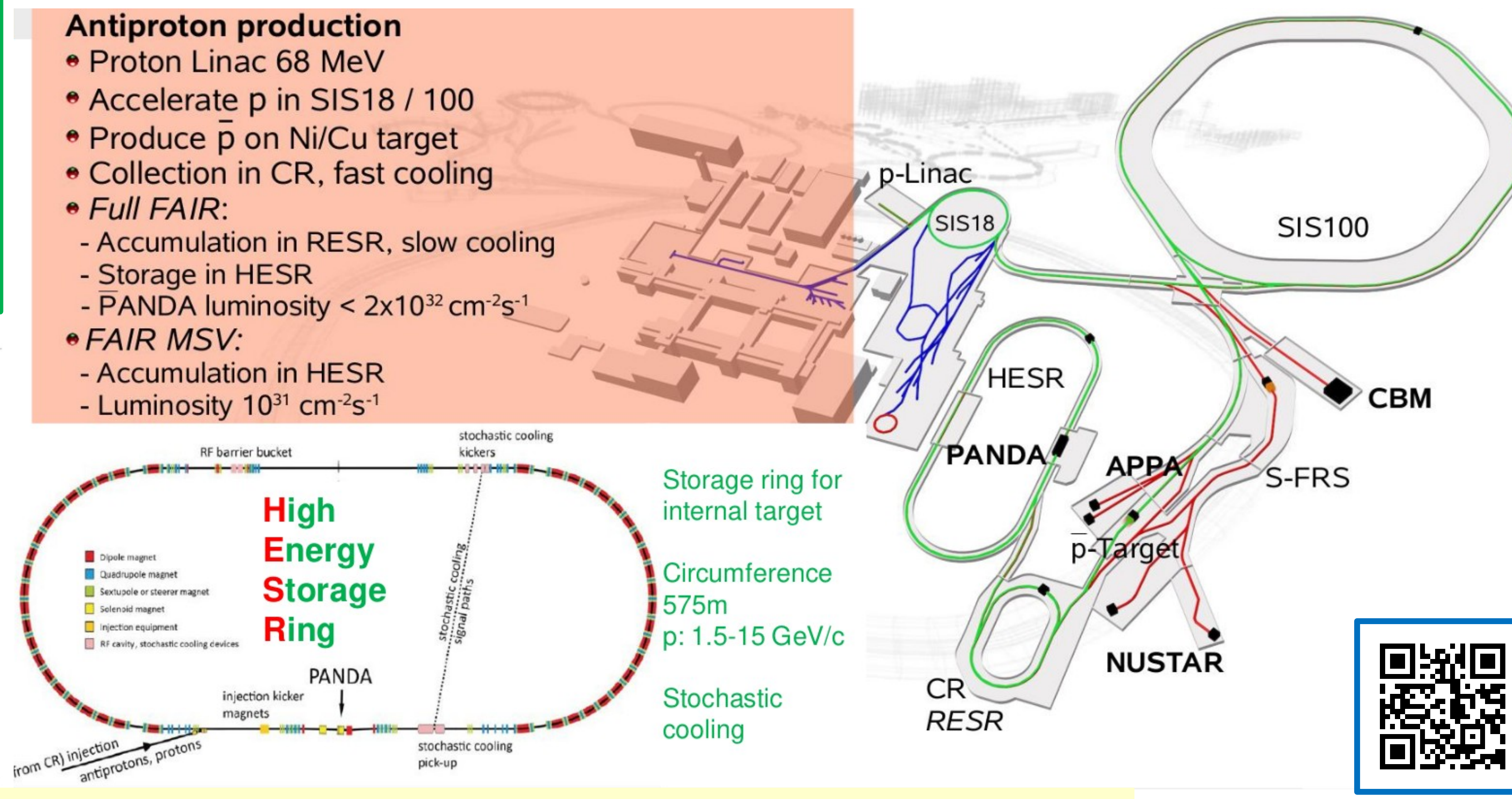
- Outer Tracker straw tube brief specs**
- Tube element**
- Diameter, length: 5mm, 2.4m
 - Anode wire: 25µm at 1550 V
 - Gas: Ar/CO₂/O₂ (70/28.5/1.5)
- Module**
- Independent upper and lower parts
 - Two staggered layers of 64 tubes /part
 - Single sided readout /part
- Whole Detector**
- 53,760 straw tubes, 216 modules, 432 FEE
 - Area coverage: (5 x 6)m² x 12 planes
- Performance at LHCb (Run1&2)**
- ε ~ 98%, σ ~ 170 µm
 - δp/p ~ 0.4% (2-100 GeV tracks)



FAIR consists of a superconducting ring accelerator of 1.1km circumference and storage rings with several kilometers of beam lines. GSI accelerators will serve as the first acceleration stage.

Antiproton production

- Proton Linac 68 MeV
- Accelerate p in SIS18 / 100
- Produce \bar{p} on Ni/Cu target
- Collection in CR, fast cooling
- Full FAIR:
 - Accumulation in RESR, slow cooling
 - Storage in HESR
 - PANDA luminosity <math> < 2 \times 10^{32} \text{ cm}^{-2} \text{ s}^{-1}</math>
- FAIR MSV:
 - Accumulation in HESR
 - Luminosity $10^{31} \text{ cm}^{-2} \text{ s}^{-1}</math>$

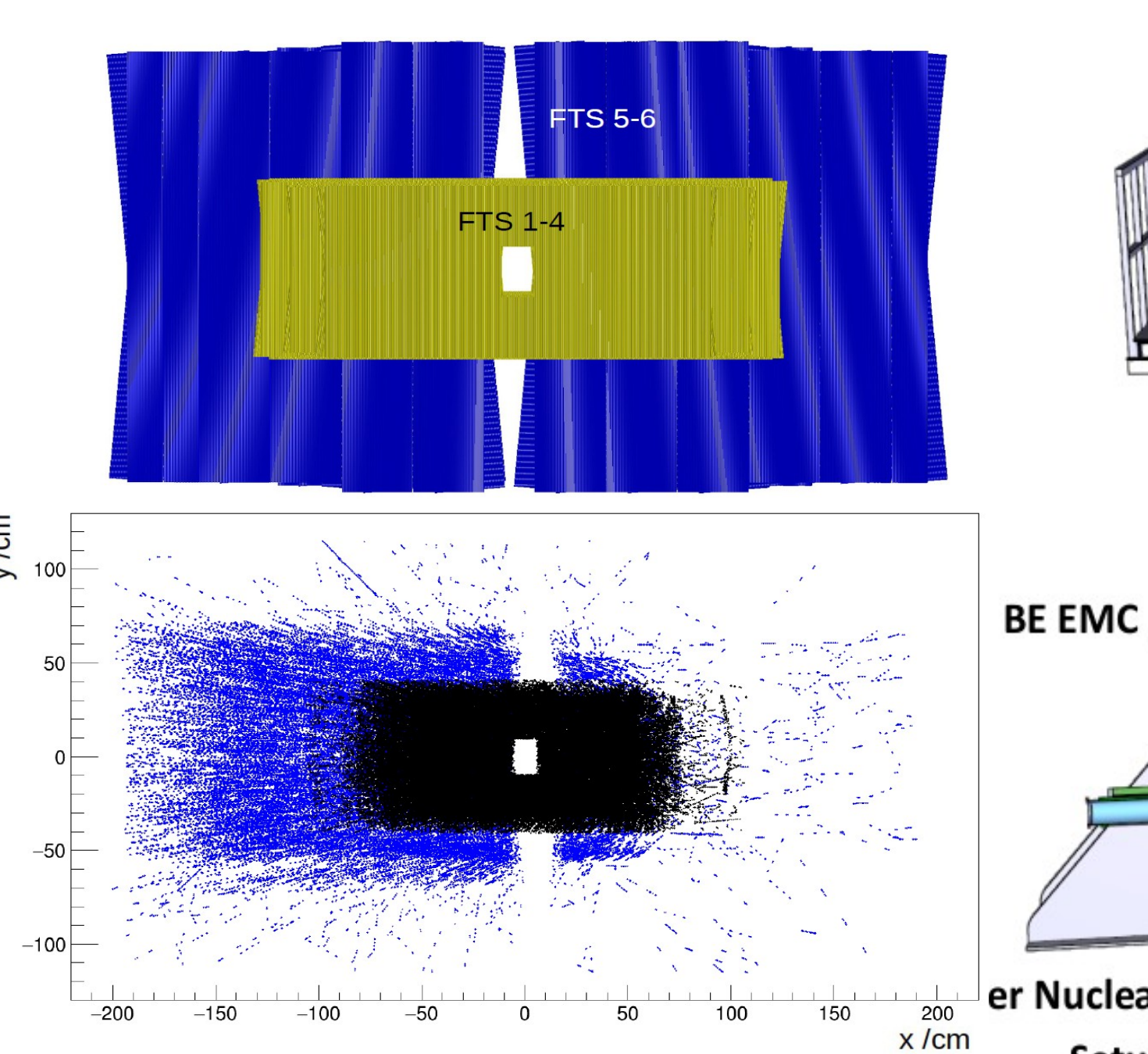


FAIR research pillars

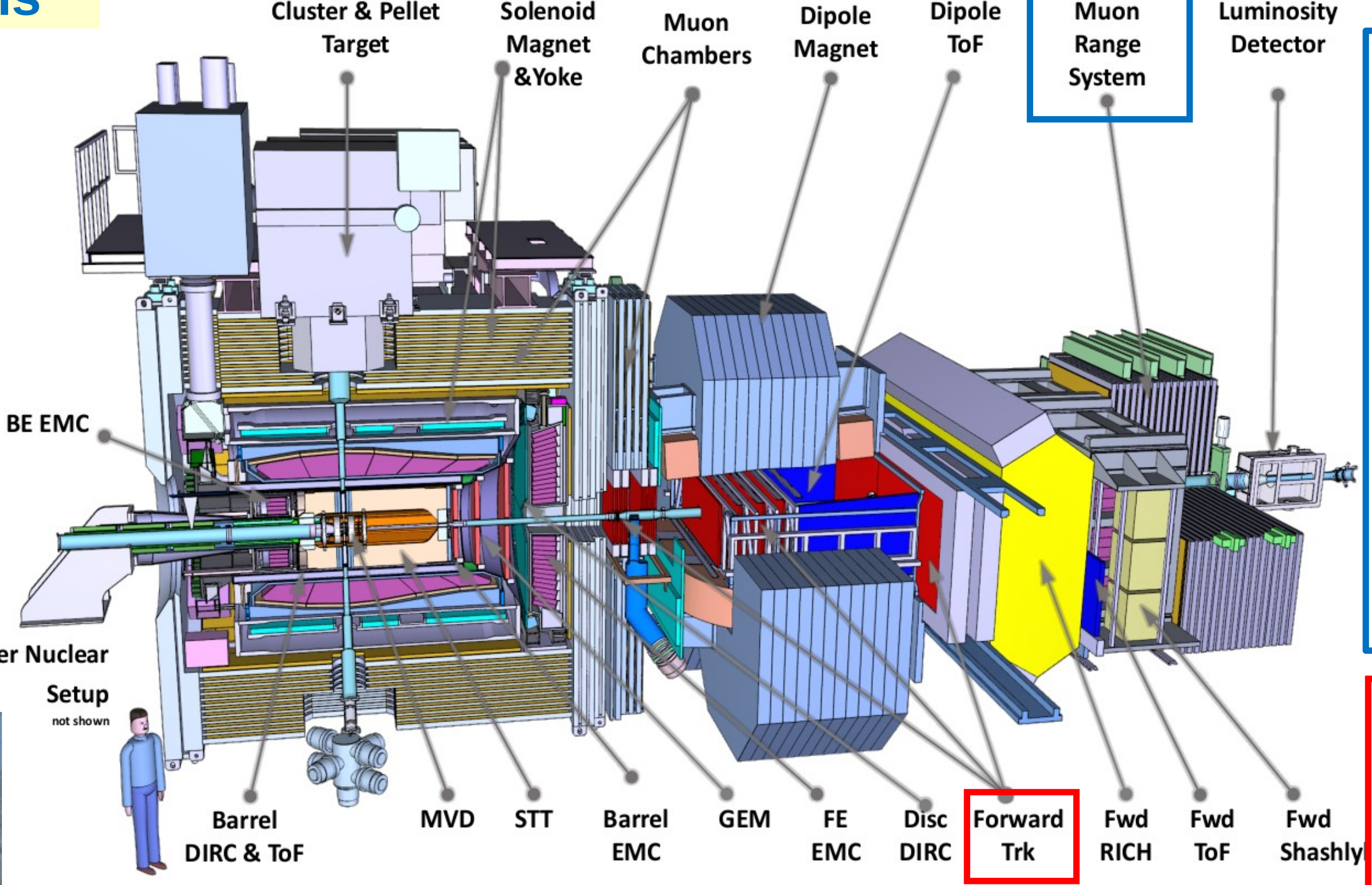
- NUSTAR** - Nuclear Structure Astrophysics and Reactions
- CBM** - Compressed Baryonic Matter
- PANDA** - Antiproton Annihilation at Darmstadt
- APPA** - Atomic, Plasma Physics and Applications

OT Team @ GSI
 A. Belias, R. Böhm, D. Glaab, N. Ibršimović (Univ. Sarajevo), R. Karabowicz, S. Koch, U. Kurilla, J. Lancione (Univ. Torino), J. Lühning, K. Peters, L. Schmitt, L. Schramm, M. Traxler, P. Zumbach

PANDA - OT Simulations



PANDA TARGET & FORWARD SPECTROMETER



PANDA - OT use cases

