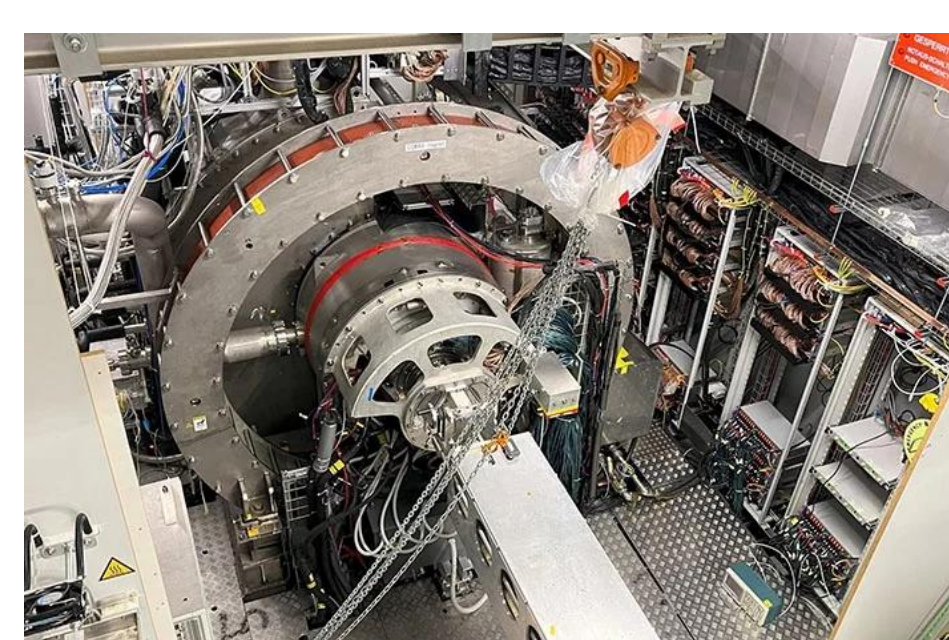


Search for new physics

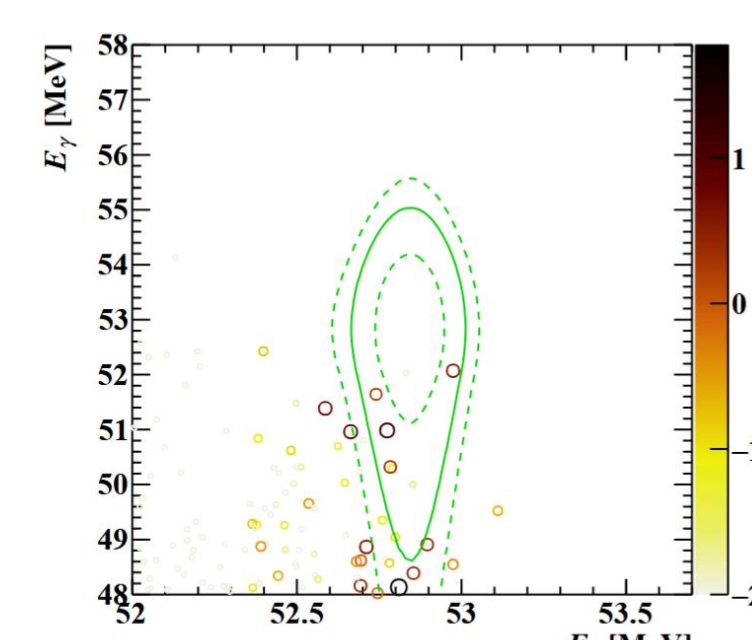
- Lepton Flavor Violating process, almost **forbidden in SM**
- Many models of **New Physics** beyond SM predict sizable branching ratio even up to present experimental upper bound

Best upper limit in the world: [arXiv:2504.15711 (2025)]

$$B(\mu^+ \rightarrow e^+ \gamma) < 1.5 \cdot 10^{-13} \text{ at } 90\% \text{ CL}$$



MEG II apparatus



MEG II latest result

Good positron momentum resolution

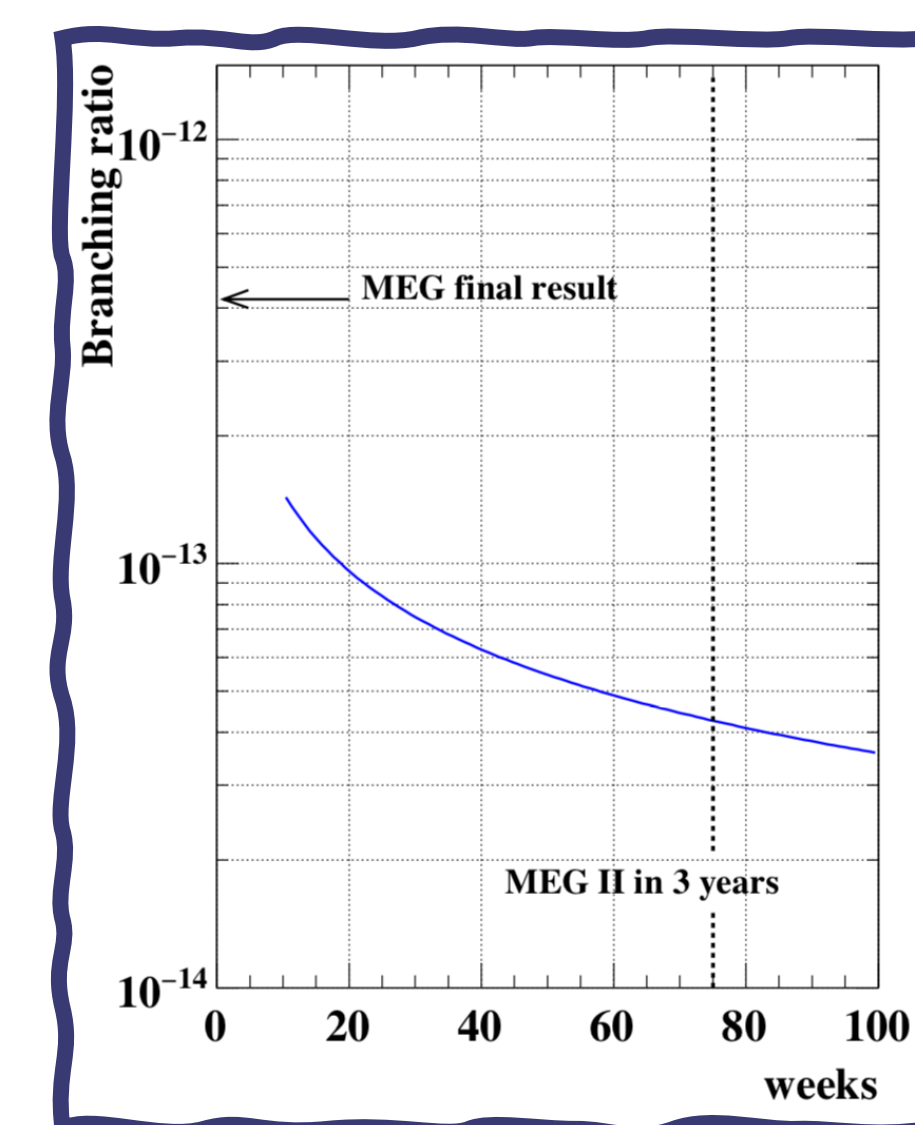
52.8 MeV

52.8 MeV

Good photon energy resolution

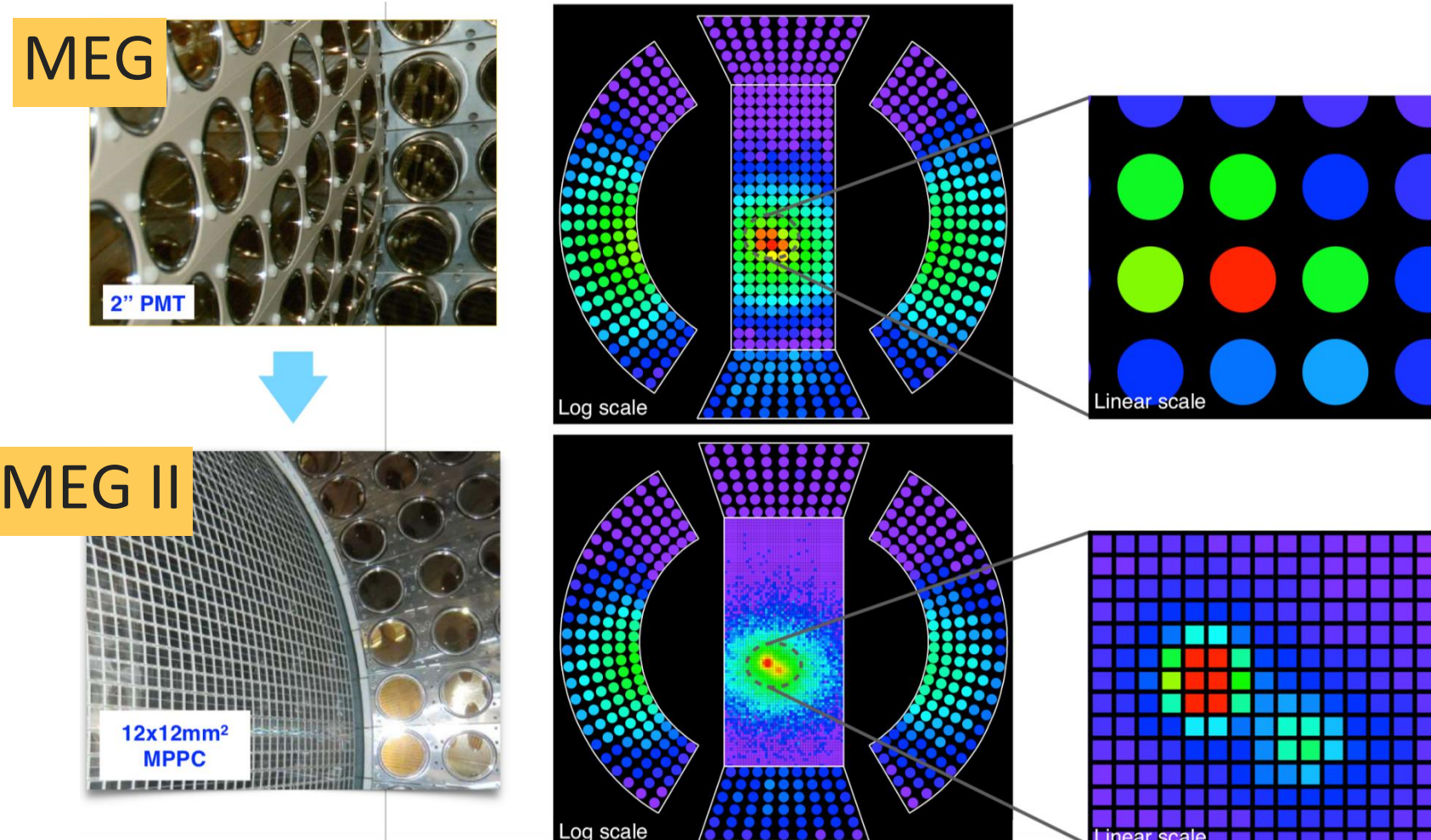
Good ey relative time and angle resolution

$$\mu^+ \rightarrow e^+ \gamma$$



MEG II UPDATE:
goal sensitivity of $6 \cdot 10^{-14}$:
one order of magnitude better than MEG result

LXE CALORIMETER

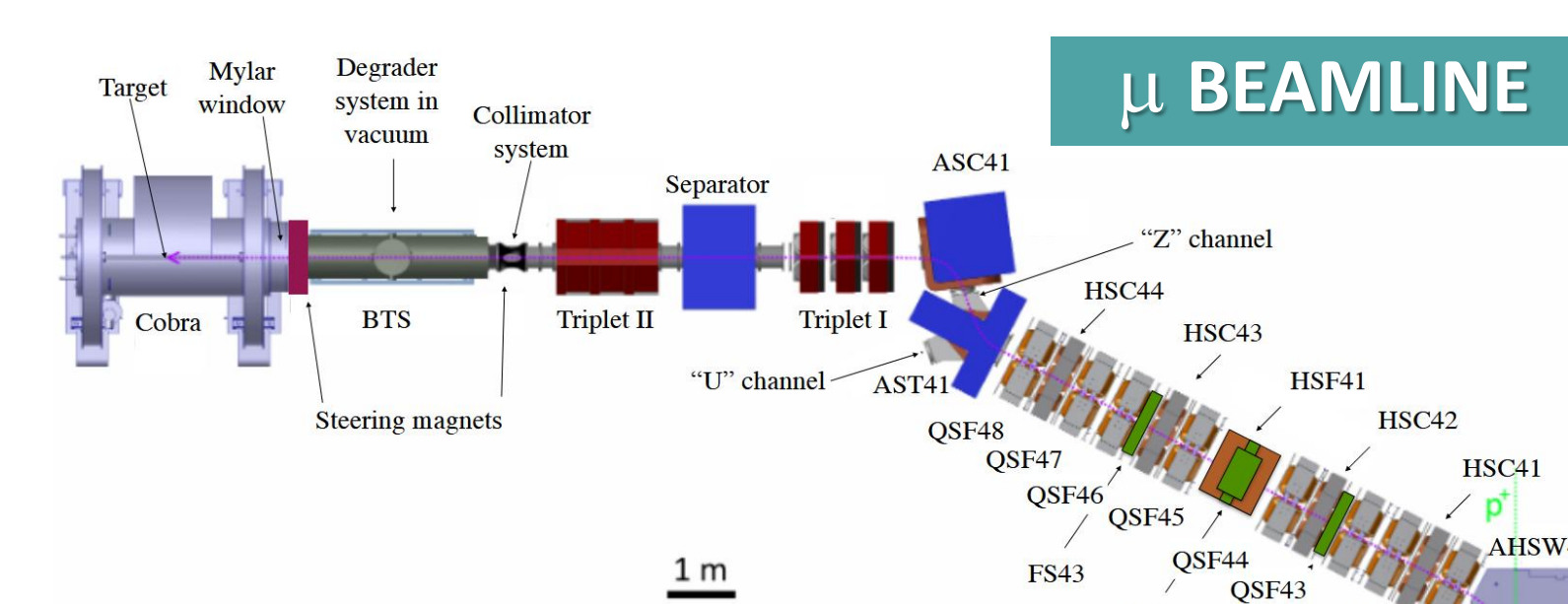
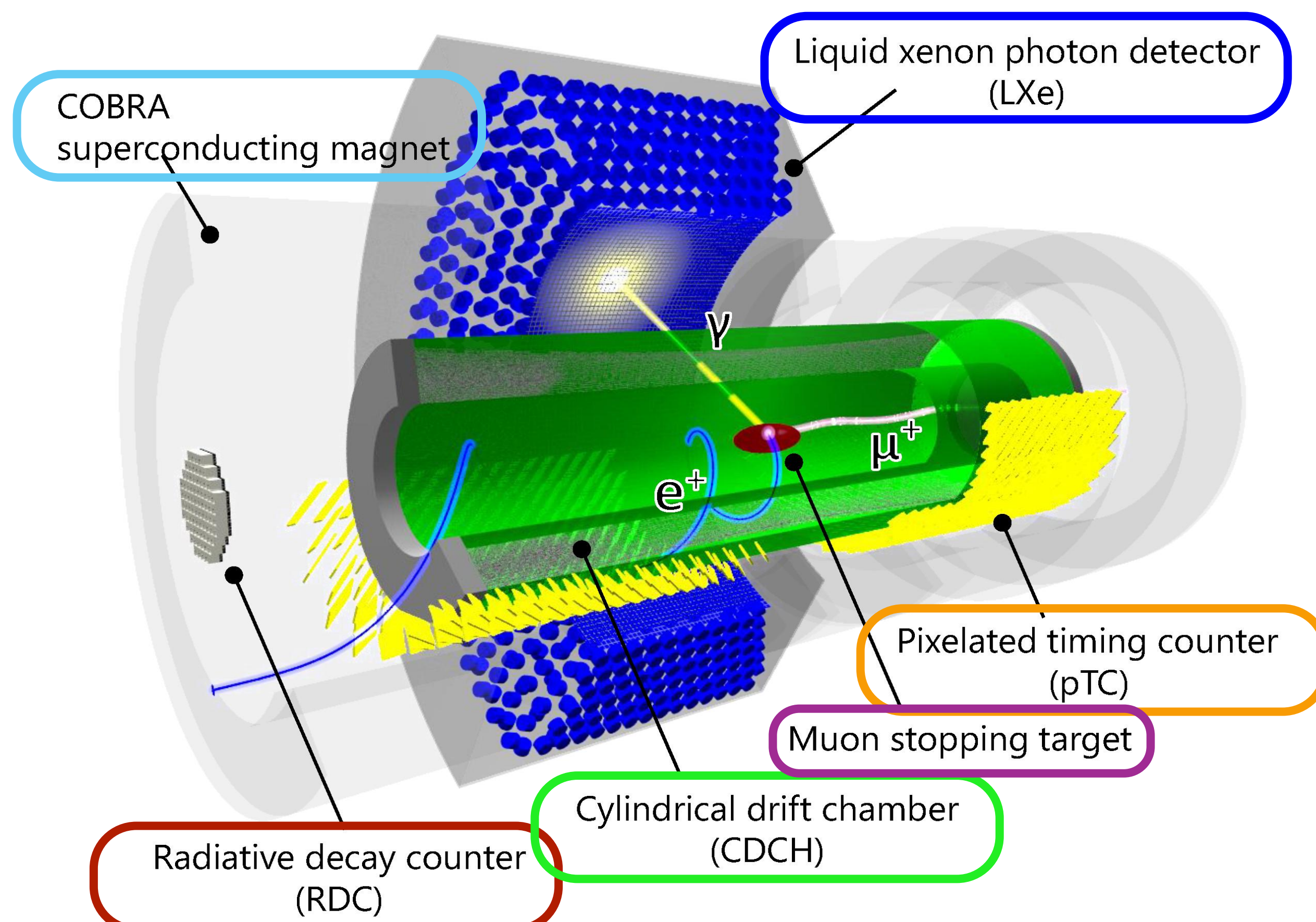


Calorimeter measures photons':

- Energy: total number of photoelectrons
- Position: PMT output distribution
- Time: photon arrival time

COntant Bending RAdius (**COBRA**) magnet

- Thin-wall superconducting magnet 0.19X0
- Special gradient magnetic field

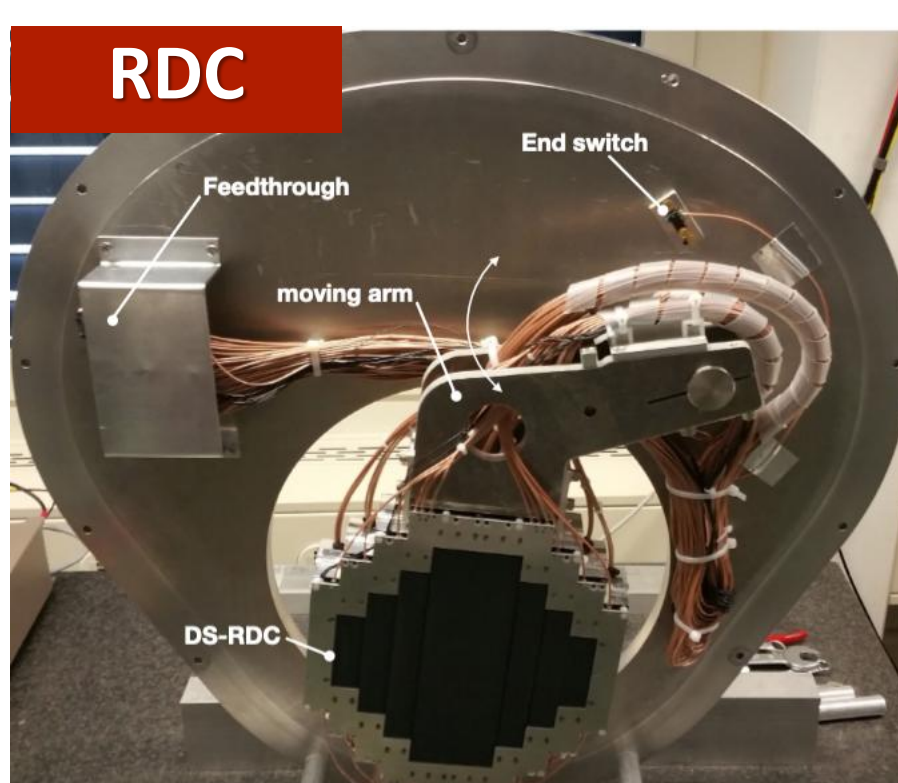


PSI $\pi E5$ beam channel

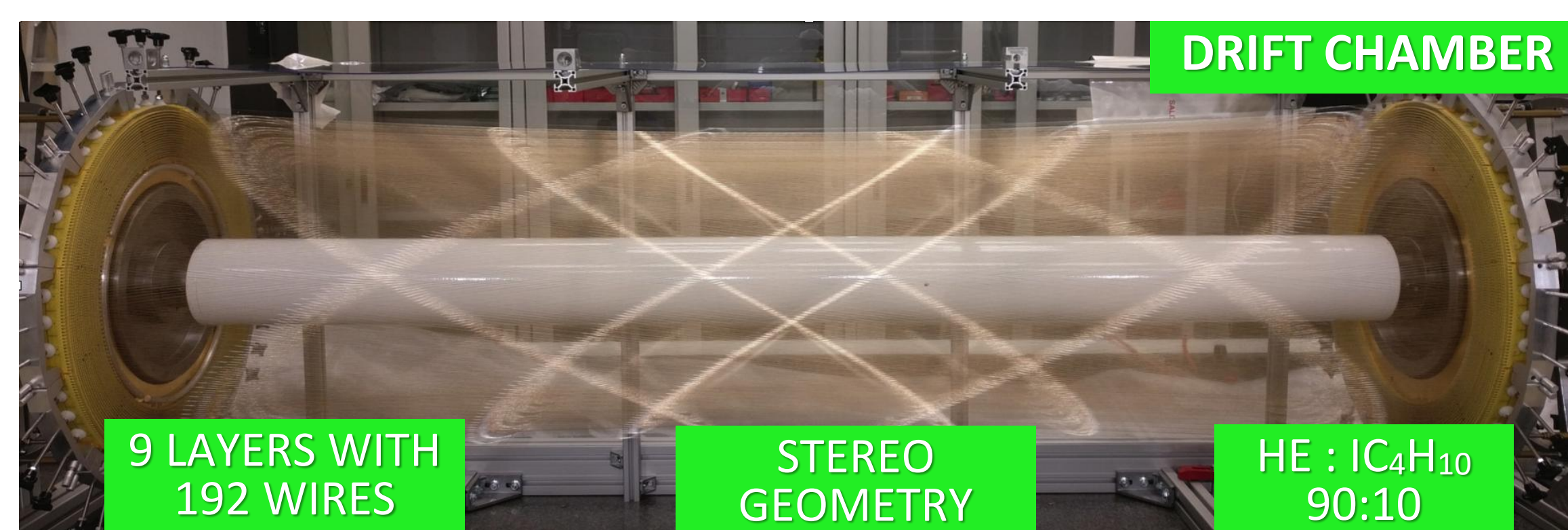
- DC surface muon beam (28MeV/c) with rate $\sim 10^8 \mu^+/\text{sec}$
- Beam spot size $\sigma_x, \sigma_y \sim 11 \text{ mm}$
- Wien filter for μ^+/ϵ^+ separation



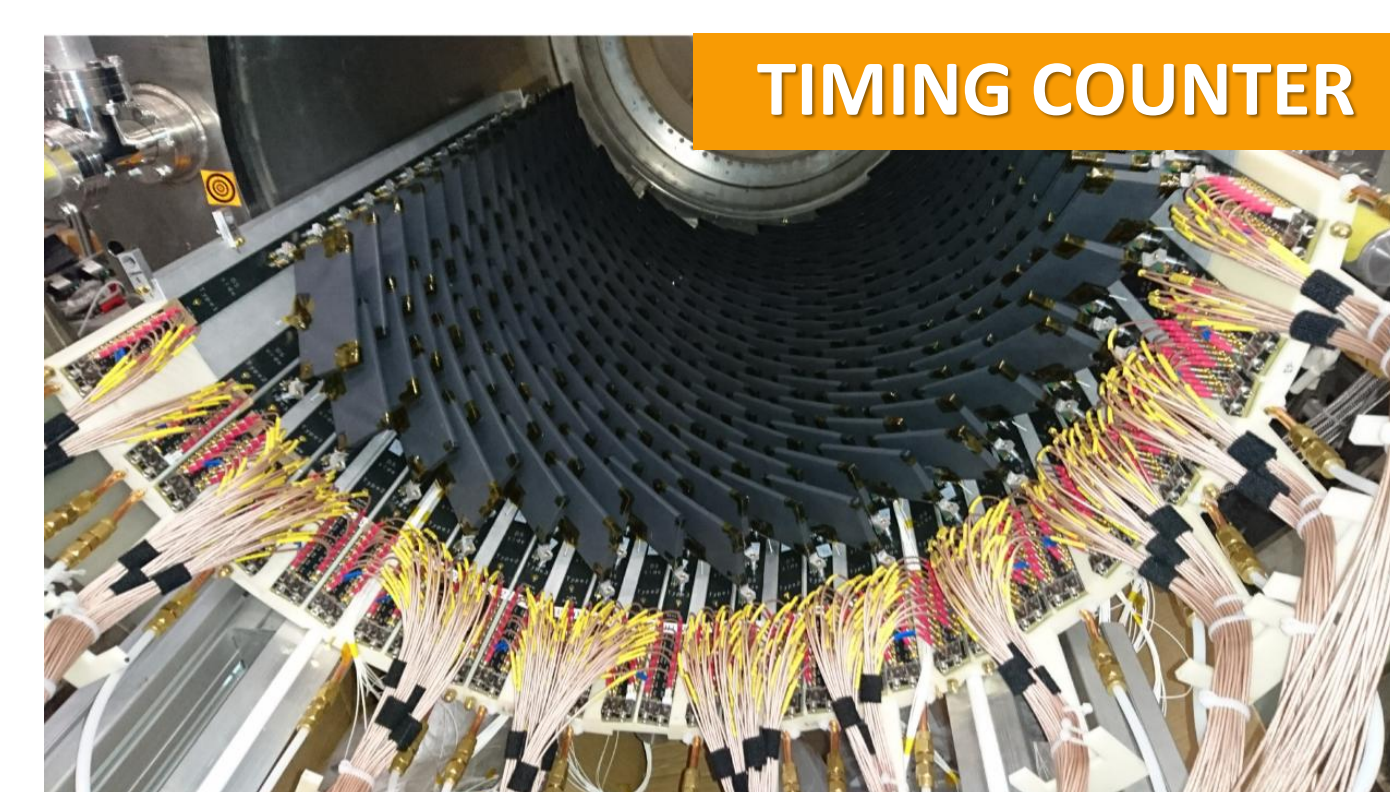
Thin scintillation target



- Looks for low energy positrons for background suppression
- LYSO crystal read by SiPM for energy measurements
- Plastic Scintillators read by SiPM for time measurements



- Single volume drift chamber
- Light, to reduce multiple scattering
- Measures positron energy



- Fast scintillator pixels read by SiPM
- Measures positron time with $\sim 30 \text{ ps}$ precision

ROME GROUP ACTIVITIES

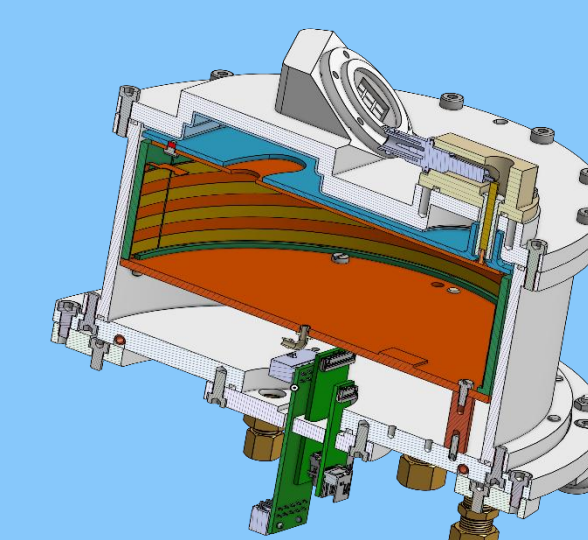
- MEG II drift chamber gas system and analysis
- Target position measurements system
- Studies on gaseous mixtures properties
- Design, assembly and characterization of innovative gaseous detectors

INTERNATIONAL COLLABORATION

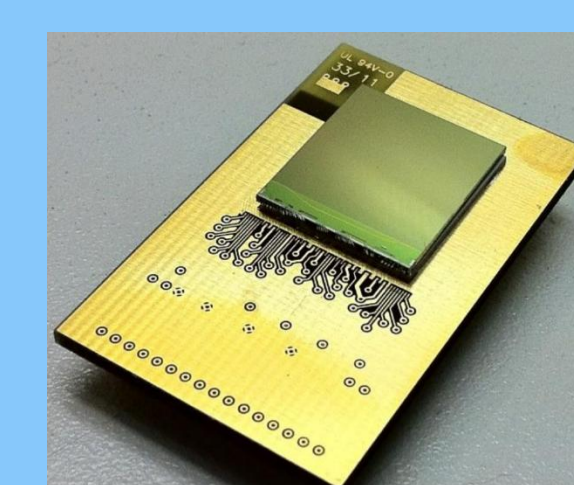
- ICEPP. Univ. of Tokyo, KEK, Waseda Univ.
- INFN - Pisa, - Genova, - Pavia, - Roma, - Lecce
- Paul Scherrer Institute
- BINP, Novosibirsk, JINR, Dubna
- Univ. of California, Irvine

AVAILABLE THESIS

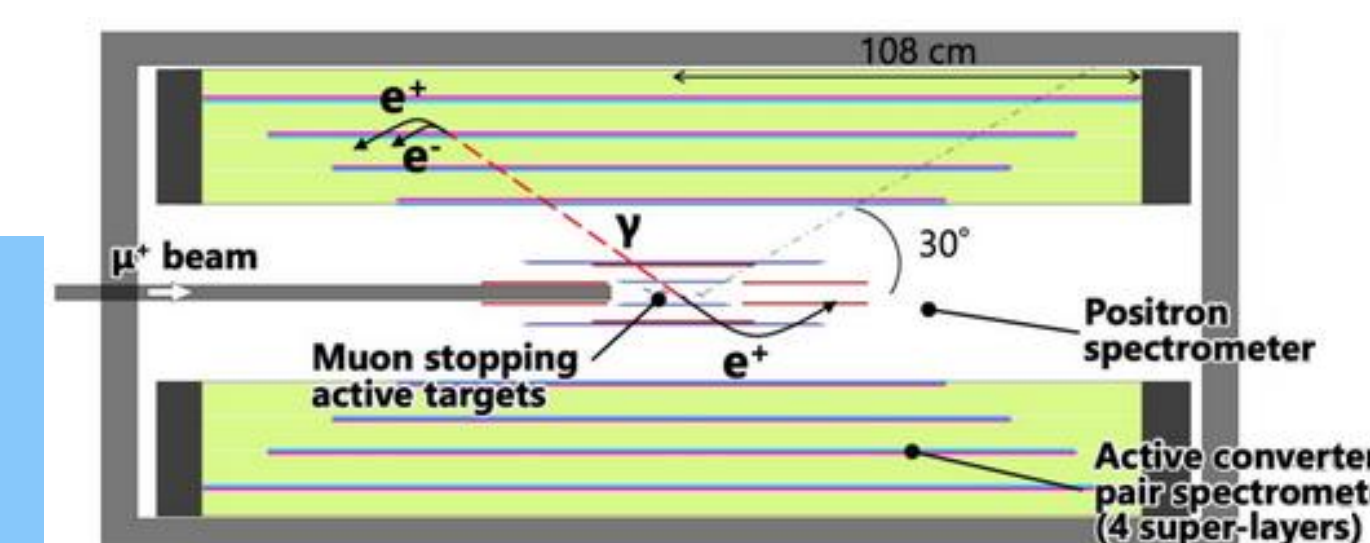
- Development of a gaseous detector for future $\mu^+ \rightarrow e^+ \gamma$ experiments (HW)
- Study of performance of innovative gasoues mixtures for tracking detectors (HW)
- Characterization and data analysis for an innovative TPC for low momentum particle tracking (HW, SW)



Design of the TPC detector for the **muEDM** experiment



GridPix detector



Possible layout of **future** $\mu^+ \rightarrow e^+ \gamma$ experiments