



SMART|EDM_Lab

Search for Electric Dipole Moments

Concept

New idea within the Georgian-German Science Bridge (GGSB) to foster the mutual cooperation between **Forschungszentrum Jülich** and **Georgian universities** (AUG, GTU, ISU, TSU).

SMART|Labs (SMART: **S**cience, **M**edicine, **A**ppplied Research and **T**echnology) are small, well equipped and maintained modern laboratories in Georgia, which will contribute in different fields of fundamental and applied science.

Goals:

- Large educational impact for the young generation of (Bachelor, Master and PhD) students.
- Emergence and further development of Georgian frontier science and future technology.
- Connection with a forefront scientific or a medical question/problem.
- Strong technological component with possible applications.

Implementation:

- Small group (3-5) of scientists/engineers and students around an outstanding young Georgian researcher.
- Strong ties with (at least) one international research partner to assure, e.g., access to world leading research infrastructures.
- Georgian senior scientist(s) at the partner institution to ensure communicative and administrative continuity.
- Support with start-up resources to set up the Lab and effectively initiate its international activities.

Objectives

Scientific Background

Search for charged particle electric dipole moments (**EDM**) in storage rings (srEDM)

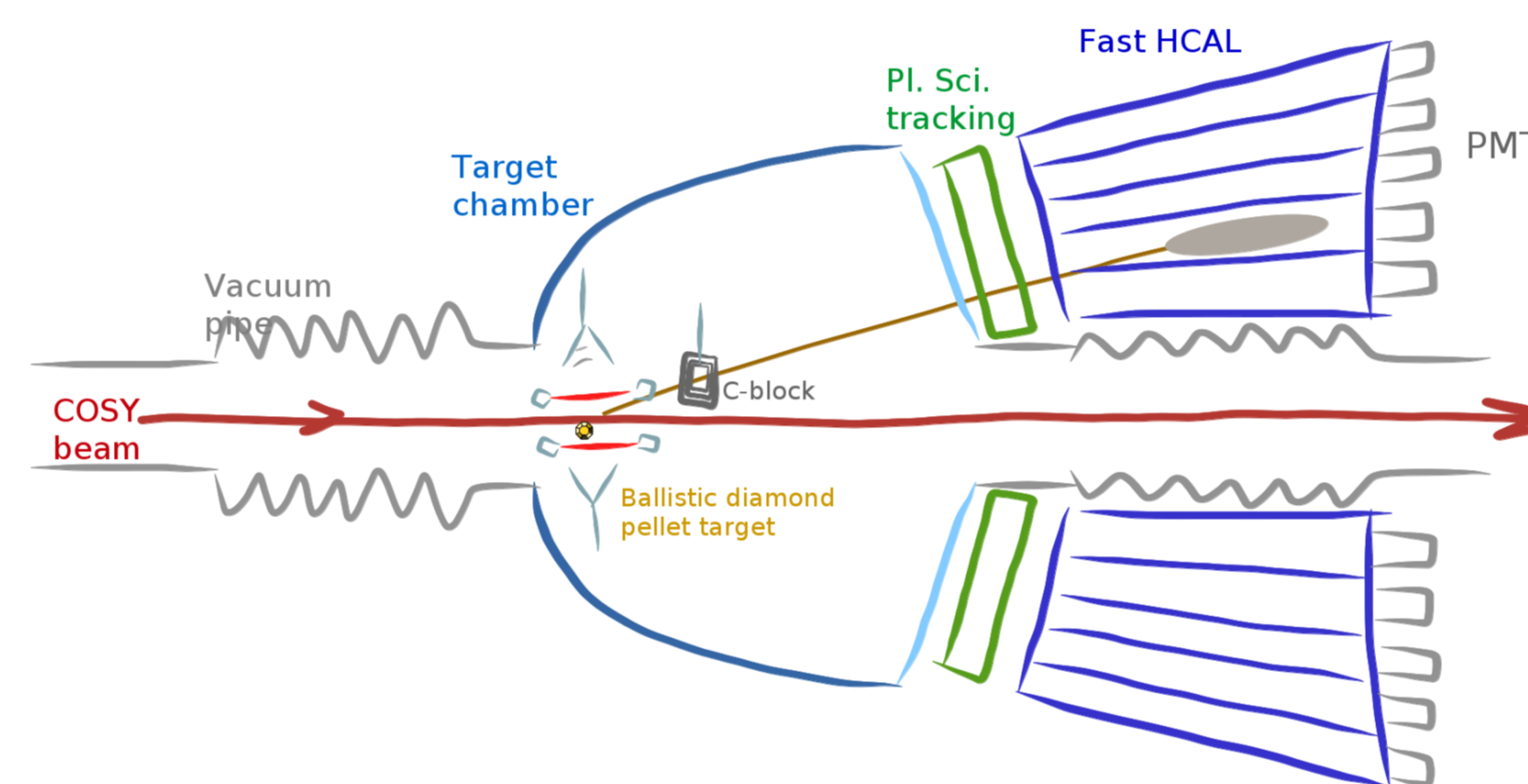
Understanding matter-antimatter asymmetry of our Universe (puzzle of our existence)

Polarimetry is the key-technology for srEDM

→ Major contributions of SMART|EDM_Lab

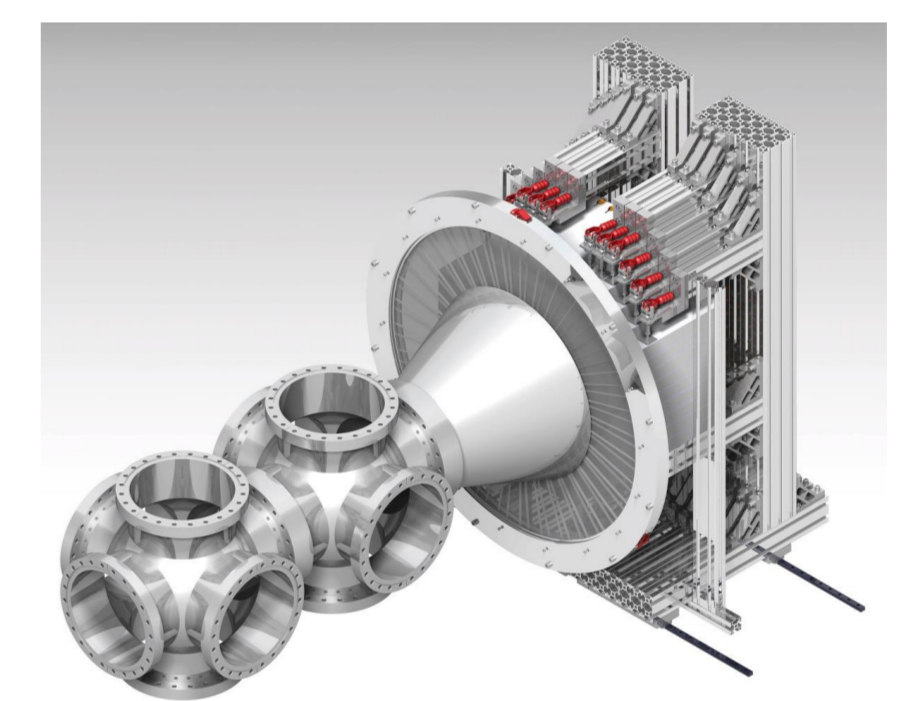
Polarimeter Project

- Elastic scattering on carbon target
- Heavy crystal (LYSO) calorimeter
- Micro-pellet carbon target



Work Packages

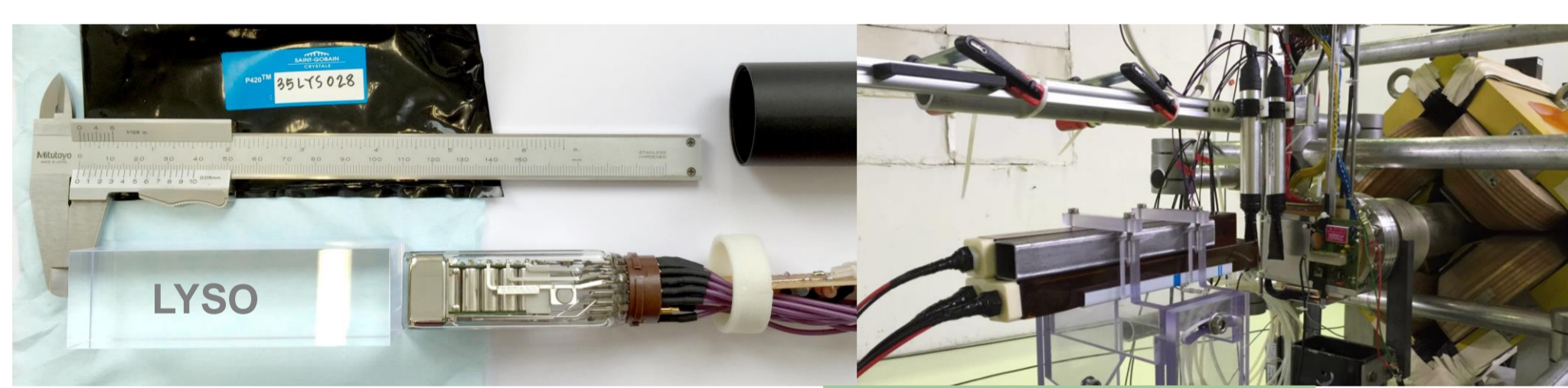
- Calorimeter, target development
- Polarimeter assembly and tests
- EDM measurements COSY-Jülich



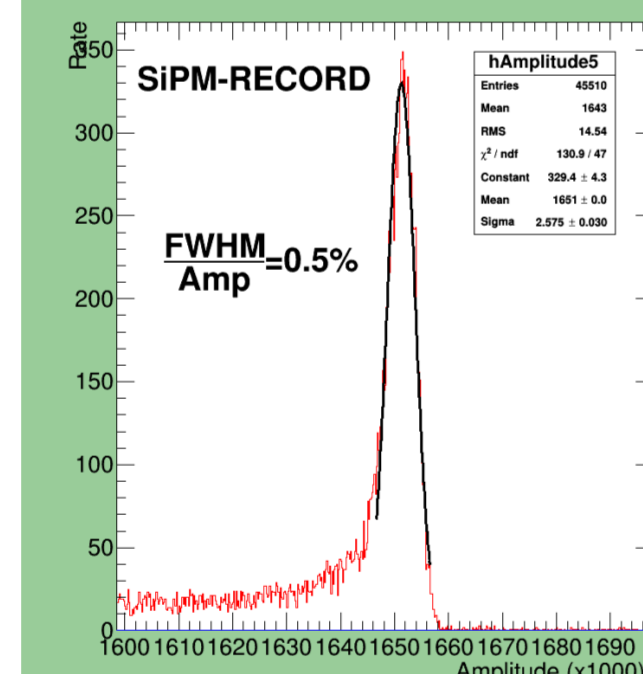
Applications (e.g. medical imaging)

On-going Activity: Calorimeter

Beam tests at COSY-Jülich



Excellent energy resolution achieved with LYSO + SiPMs



On-going Activity: Target

JuDiT (Jülich Diamond Pellet Target)

Development and realization of a highly innovative technological concept for time resolved polarimetry

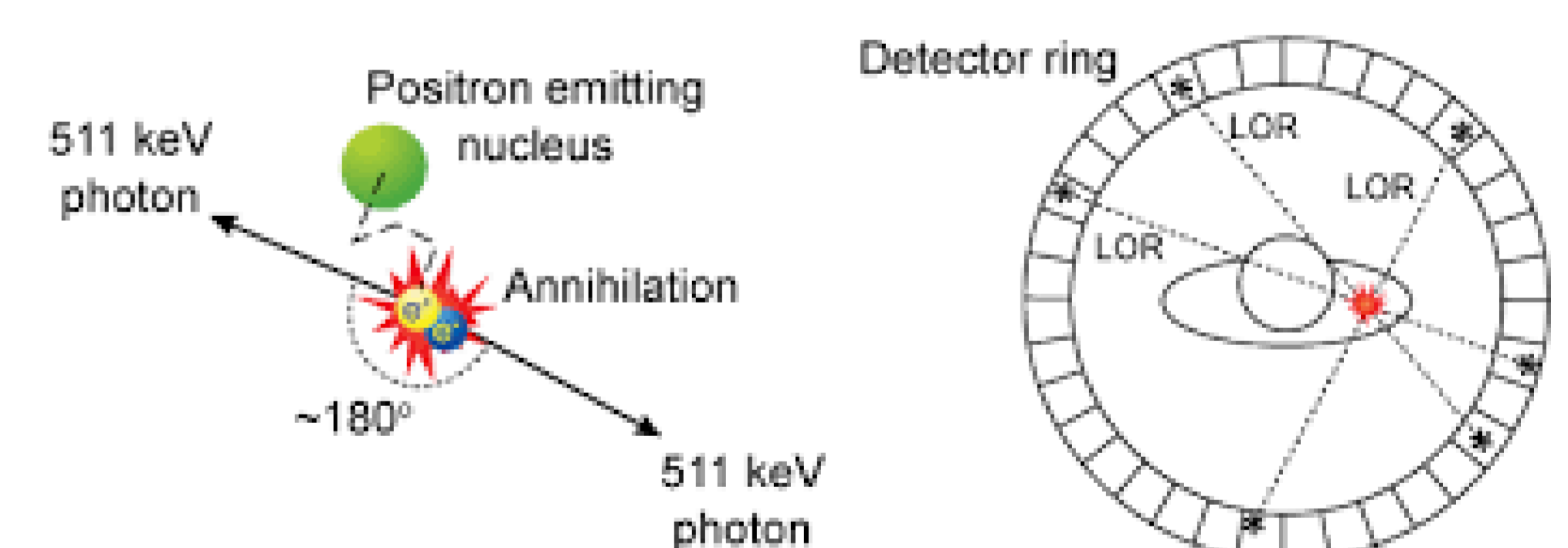
Precision movement of a single micro-sized pellet target through the storage ring beam

Mechanical shooter-catcher for pellet, electronic tracking and adjustment, slow control

Applications

e.g. **Experimental Development for Medicine**

- Si-photomultiplier (SiPM) readout for LYSO
- Use in Positron Emission Tomography (**PET**)
- next generation of PET scanners



Foundation of SMART|EDM_Lab at TSU, start January 2017

Principal Investigator



Dr. David Mchedlishvili
HEPI TSU / IKP Jülich

Collaborating Partners

- Forschungszentrum Jülich (Germany)**
- HEPI TSU (Georgia)**
- INFN, University of Ferrara (Italy)
- Institute for Basic Science (Republic of Korea)
- Jagiellonian University Cracow (Poland)
- RWTH Aachen University (Germany)

and **JEDI-Collaboration**

Deliverables

- New polarimeter target & detector concept
- Polarimeter assembly, functionality tests
- Readout development
- Proof-of-principal experiment at COSY
- Medical applications
- Education & knowledge share
- Documentation (papers, theses, talks)

<http://hepi.tsu.ge/en>

<http://collaborations.fz-juelich.de/ikp/jedi>

