Objective

Construction of a spectrometer for the tracking and measurement of the energy of light charged particles and study of the $^8$Be decay. The spectrometer will be composed of:

- Timepix3 (TPX3) [1]
- Multi-Wire Proportional Chamber (MWPC) [2]
- Time Projection Chamber (TPC) [3]

Setup under construction at the IEAP's Van de Graaff accelerator facility.

**ATOMKI: Observed anomalies in e+e- emission from $^8$Be and $^4$He**

ATOMKI Institute, in Debrecen, Hungary, measured a 6.8σ anomaly in the opening angle of e+e- pairs produced in the $^8$Be→$^6$Li+2p transition to the ground state [4,5]. Possible explanations:

- Unidentified nuclear reactions;
- Experimental effects;
- Production of a new boson [6].

Independent measurements of such anomaly are crucial.

**IEAP Spectrometer – Optimization Studies**

*Timepix3 (TPX3)*

- Event-driven pixelated detector (fast response);
- 256x256 55-μm pixels (high granularity);
- 1.6-mm time resolution;
- 14x14 mm² (fits inside the vacuum tube).

*Time Projection Chamber (TPC) Readout Optimization*

1st Prototype

- 10x10 cm² sensitive area;
- 3 mm drift volume;
- Standard triple-GEM;
- Strip readout (256 K x 256 Y);
- DAQ based on CERN's SRS with APV25 ASIC.

2nd Prototype

- 10x10 cm² sensitive area;
- 8 cm drift volume;
- Standard triple-GEM;
- 120 pad readout;

SAMA integration in SRS DAQ.

Check the QR code for more details.

References