Gaseous detector activity at LAL

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- No activity on gaseous detectors at LAL since several years.
- At present resuming via joint LAL-IRFU project on **measurement of Micromegas/InGrid performance on the electrons from PHIL @ LAL**

- Joint proposal LAL & IRFU (participation of Kiev U via students' stage)

Proposal of a flexible detector test setup using low energy electrons from PHIL at LAL for Micromegas/InGrid performance tests

PHIL provides electrons with momentum 5 MeV/c and 10^9 particles per bunch.

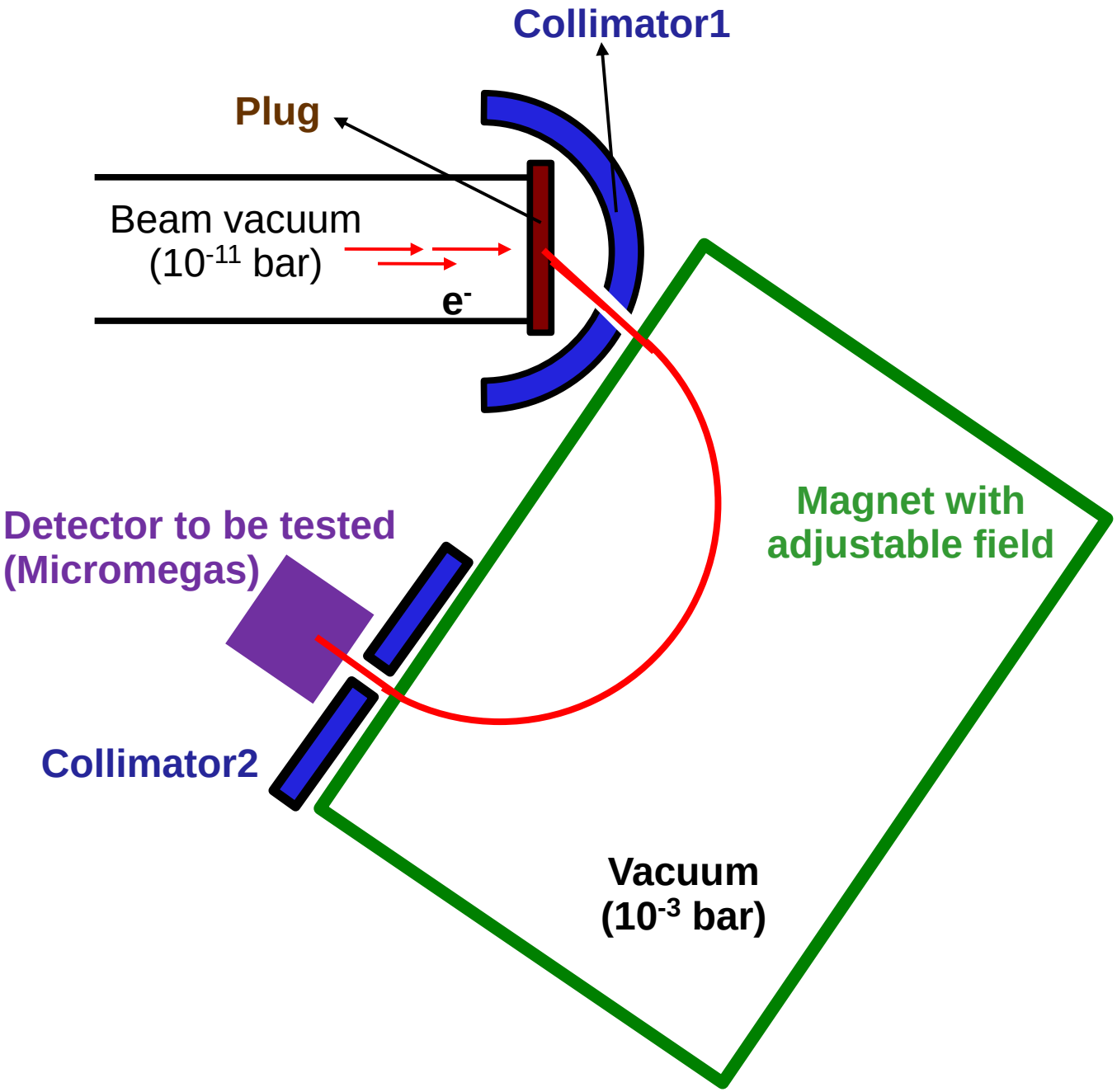
Goal: obtain samples of "monochromatic" electrons
- with energy between 1 and 5 MeV and energy spread of better than 10%
- with adjustable intensity down to 10^4 electrons per bunch

- Gaseous detector tests, e.g. routine Micromegas InGrid performance tests to optimise the protection layer
- Studying of crystal timing properties
- Timing studying of the Cherenkov detectors
- New measurements, e.g. non-relativistic electron energy losses with Micrimegas/TIMEPIX

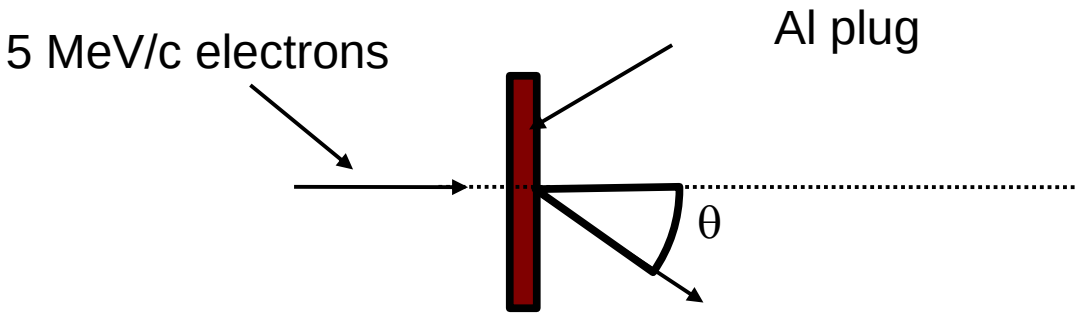
Spectrometer to sample “monochromatic” low energy electrons

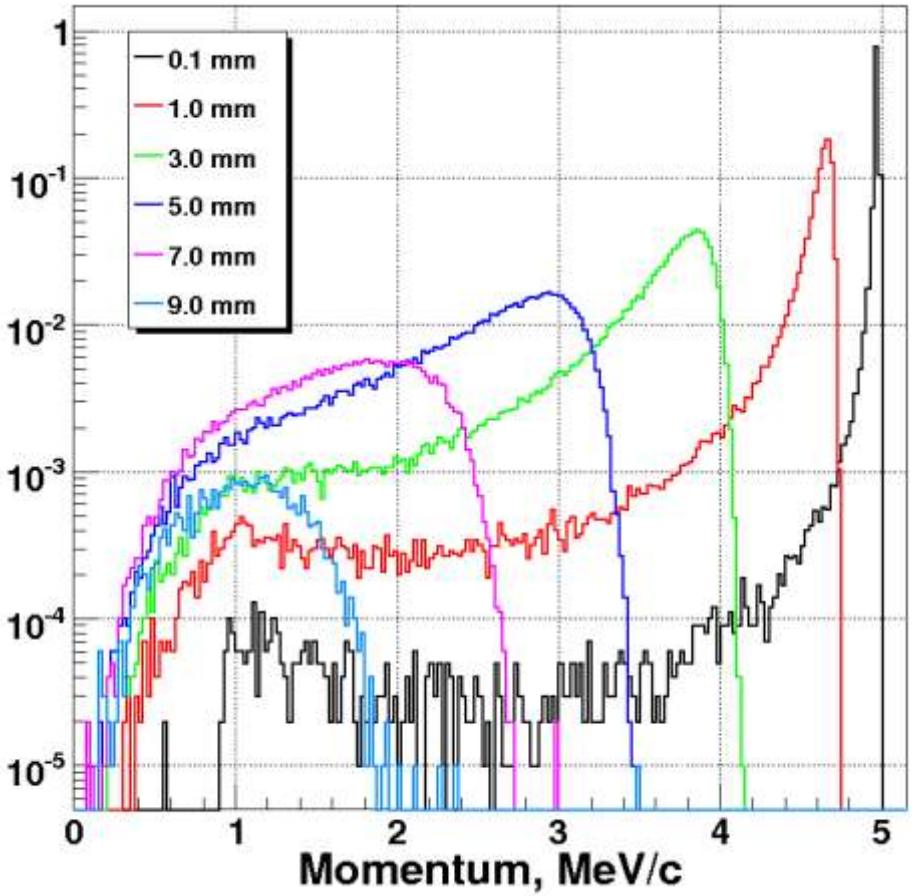
Setup idea:

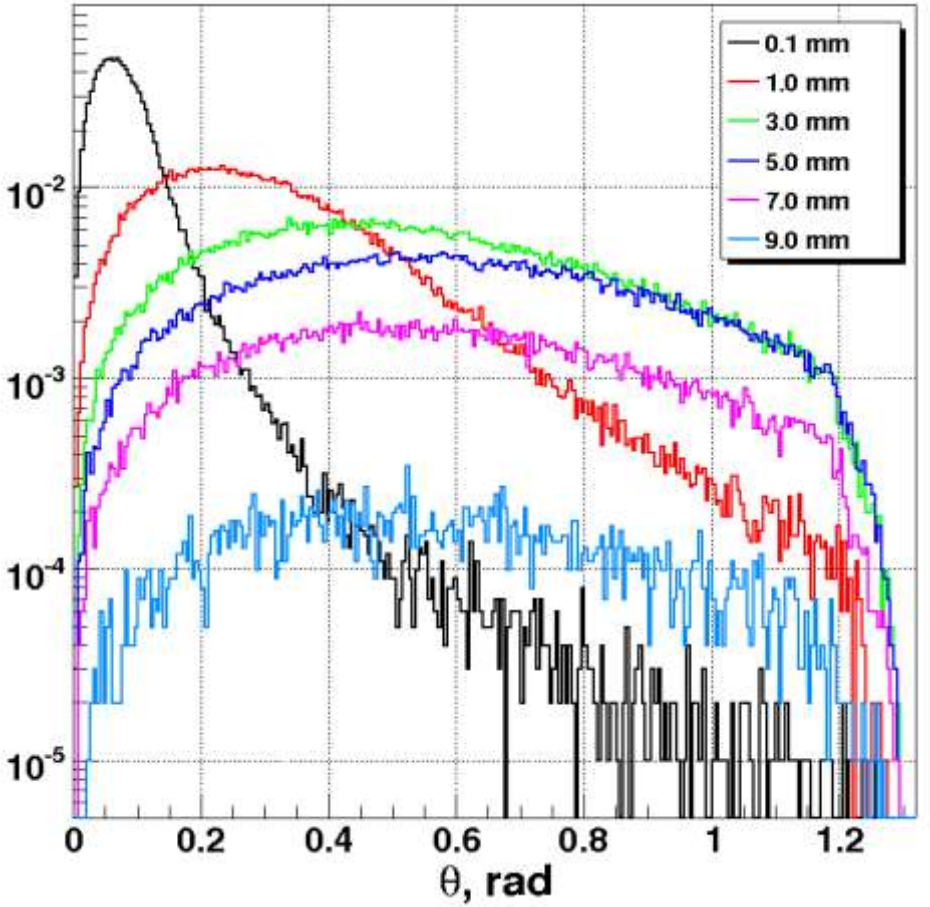
- ❑ Use electrons from PHIL
- ❑ Reduce energy/intensity using Al plug
- ❑ Select unique direction for electrons passing the plug with collimator 1
- ❑ Select required energy by half-turn of electron in the magnetic field (position of collimator 2)
- ❑ Adjust intensity/energy spread using collimator 2, positioned in front of tested detector



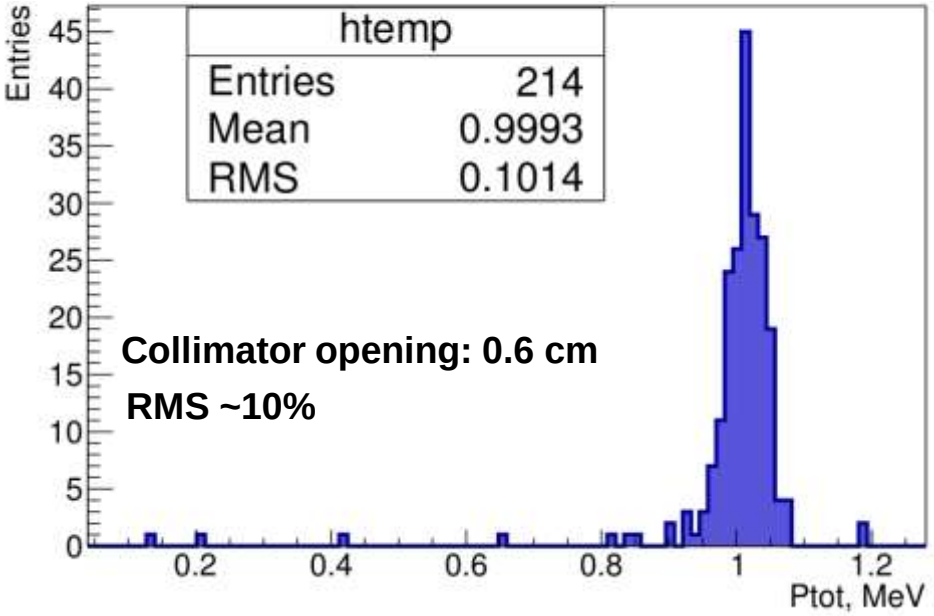
Momentum and angular spectra of electrons passing through the Al plug, depending on the plug thickness : Geant4 simulation

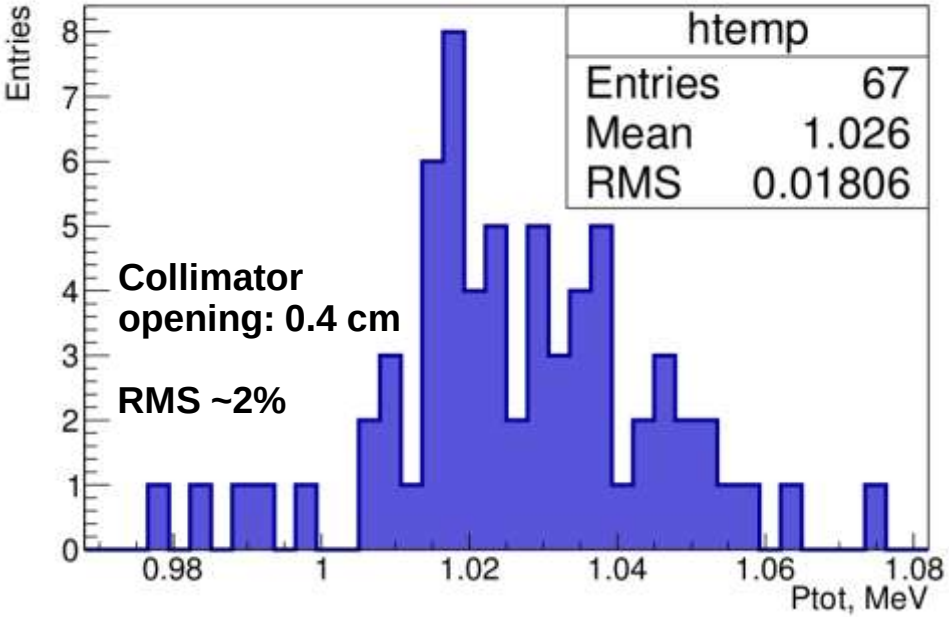






Example of sampling 1 MeV electrons from 5 MeV beam: from simulated 10^8 electrons a sample of ~10^3 electrons and momentum spread of ~10 % are obtained with collimator opening of 6 mm.





<u>LAL contribution</u> from S. Barsuk, L. Burmistrov, H. Monard, A. Variola

Project <u>cost estimate</u>: 30k

<u>Time</u> of construction <u>estimate</u>: ~6 months

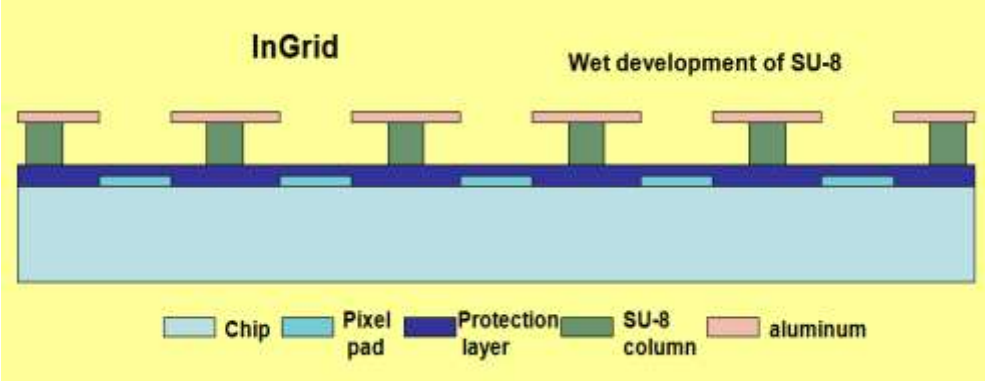
<u>Status</u>

- ❑ **Full Geant4 simulation of the setup is done**
- ❑ **Preliminary design established**
- ❑ **Negotiations with CERN to recuperate LEP correction magnet**

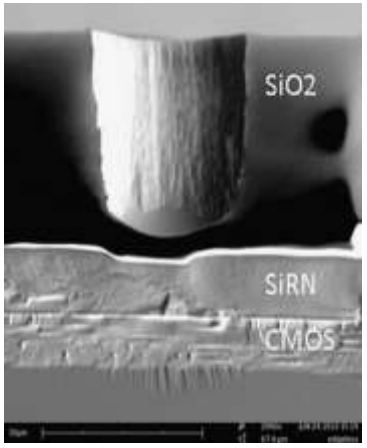
Micromegas/InGrid : IRFU / NIKHEF / Bonn U development

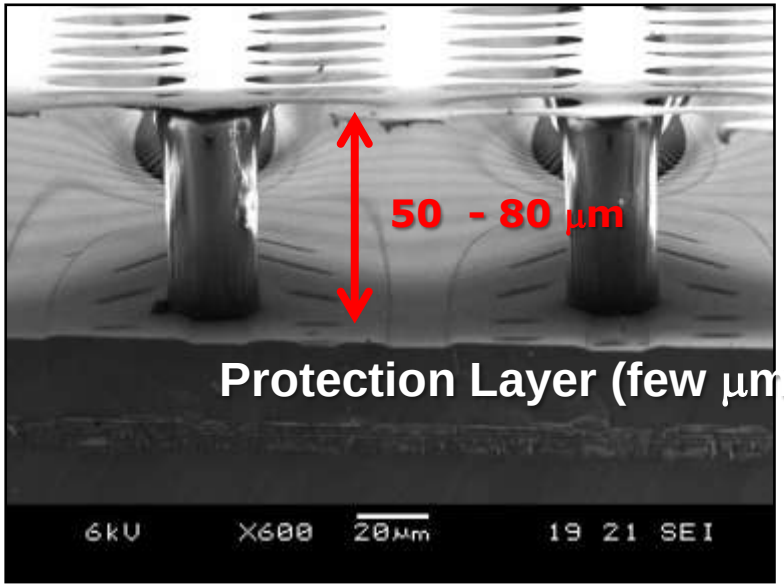
3D Gaseous Pixel Detector → 2D (CMOS pixel chip readout) x 1D (drift time)

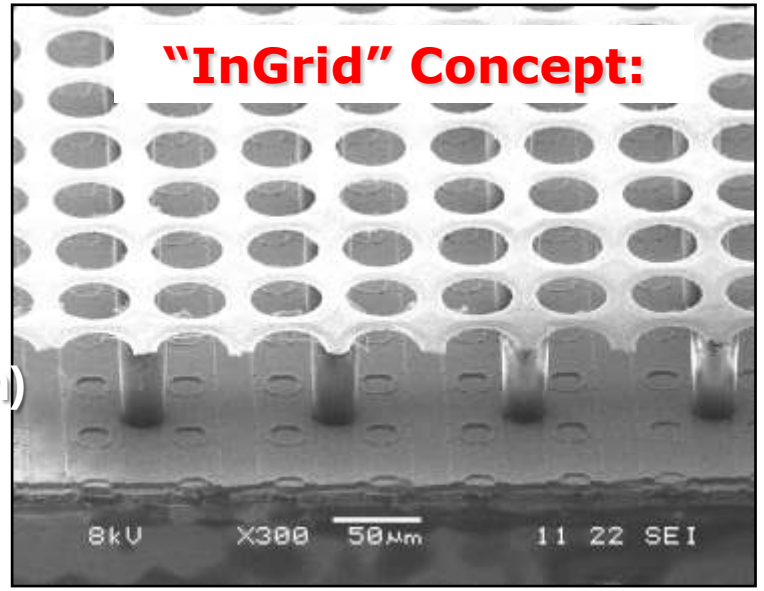
Through POST-PROCESSING INTEGRATE MICROMEGAS directly on top of CMOS chip (covered with protection layer)



- Entering the activity via full simulation of Micromegas/InGrid (+ eventual tests and data analysis) with participation of Kiev U







M. Chefdeville et al, NIMA556(2006) 490