



Vacuum Silicon PhotoMultipliers: recent developments



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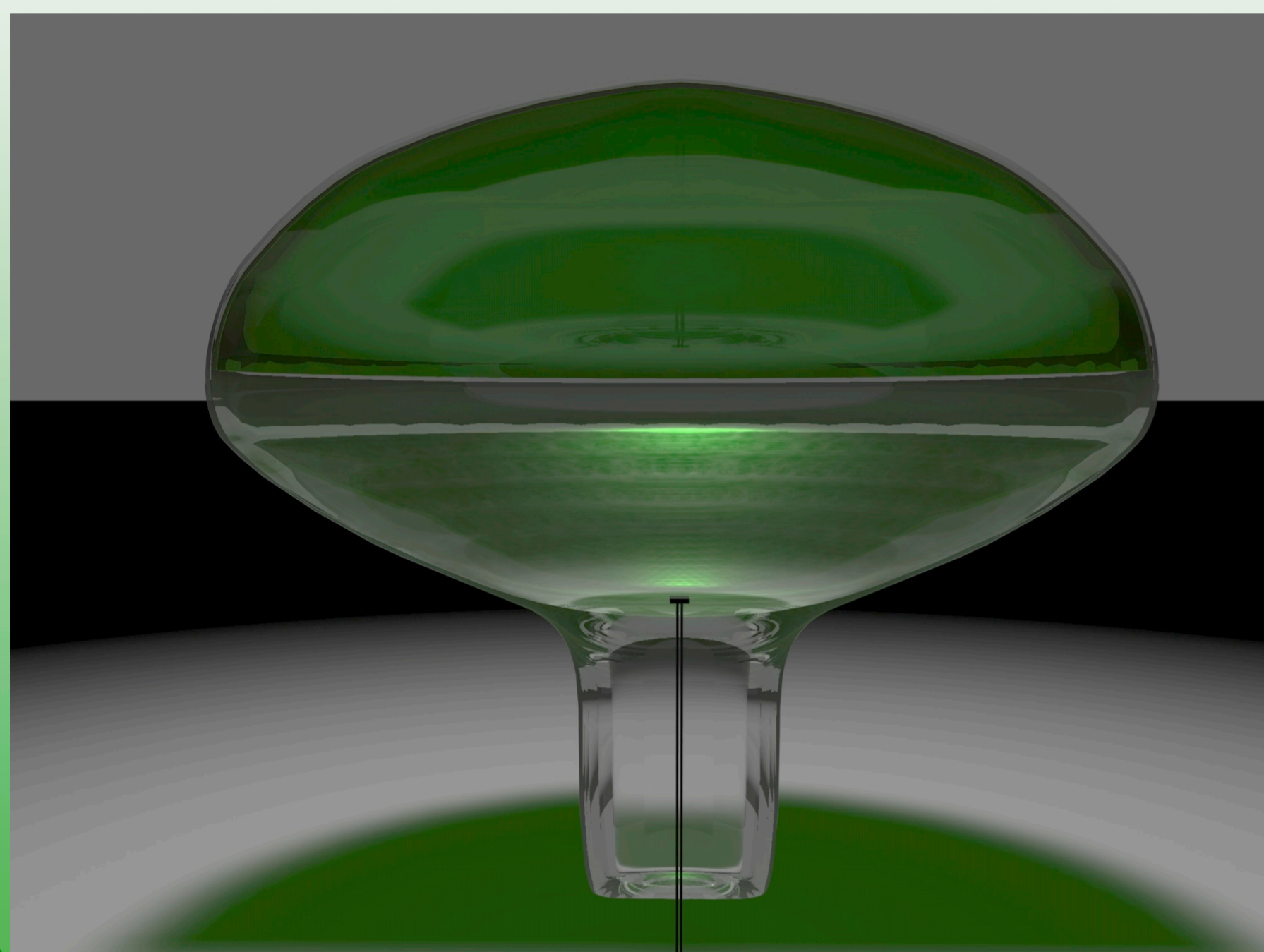
Introduction

VSiPMT (Vacuum Silicon PhotoMultiplier Tube) is an innovative design for a modern hybrid photodetector based on the combination of a SiPM with a standard PMT photocathode.

Preliminary work:

- full characterization of the SiPM with a laser source
- simulation of electron backscattering over SiPM surface
- full characterization of the SiPM with an electron source

A new concept of detector

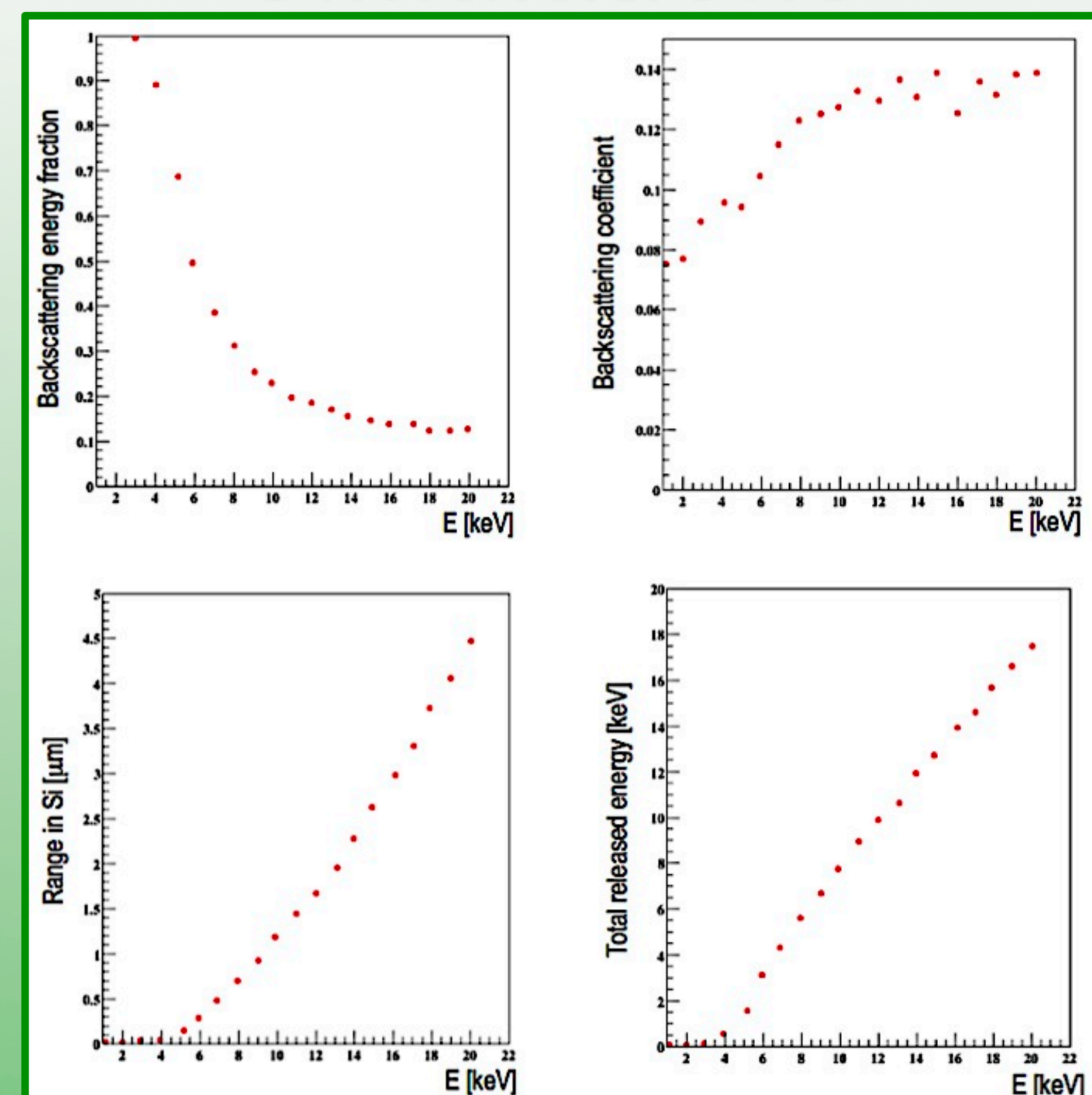


- Photocathode
- Electrostatic focusing
- SiPM as amplifier

Advantages

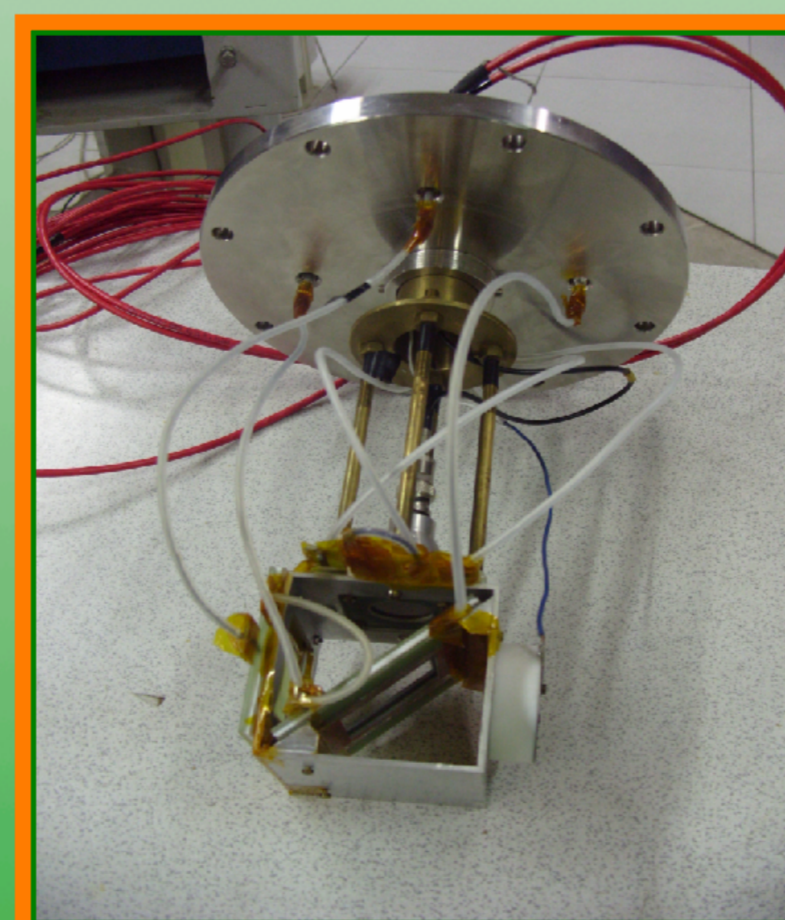
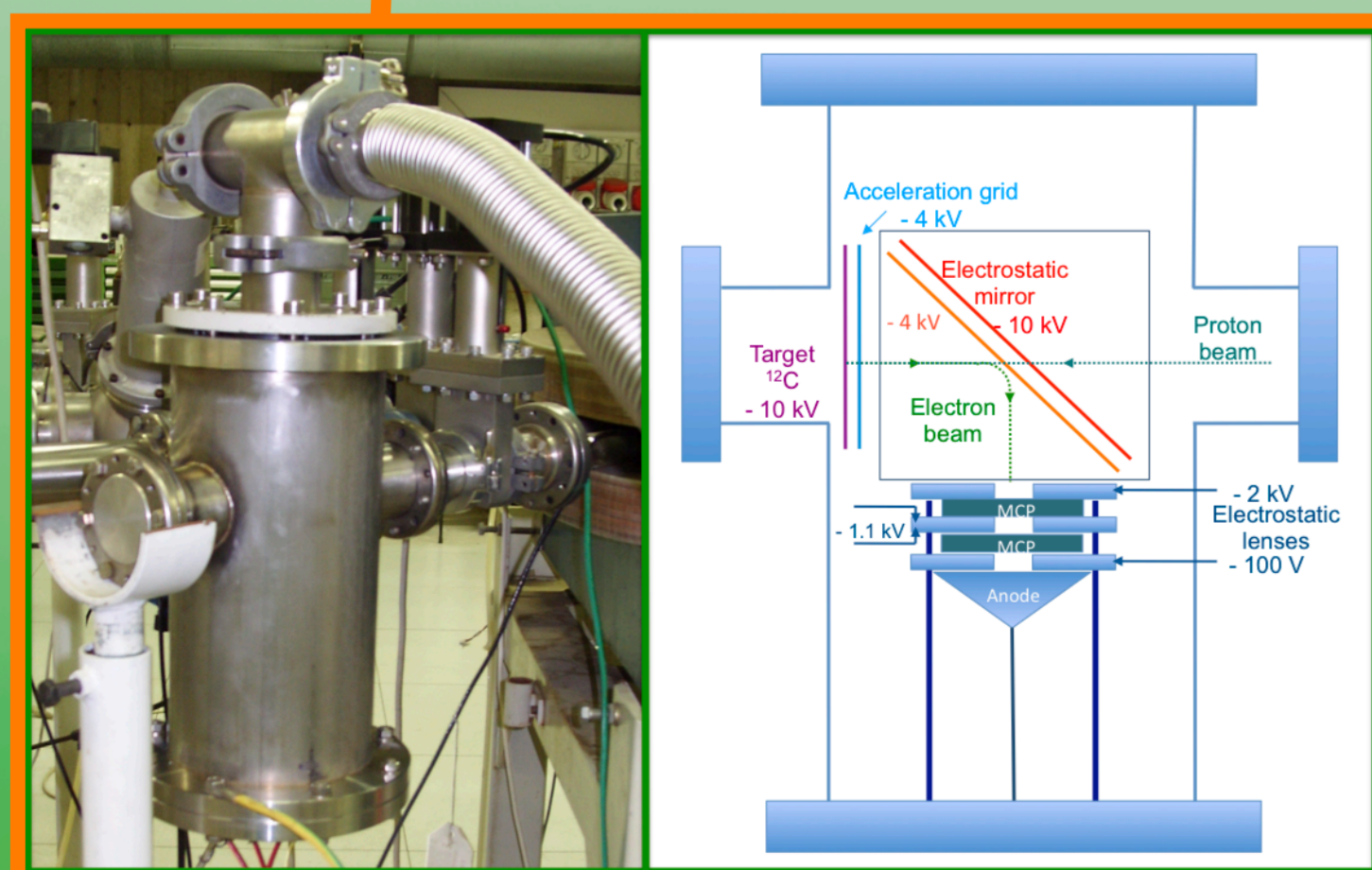
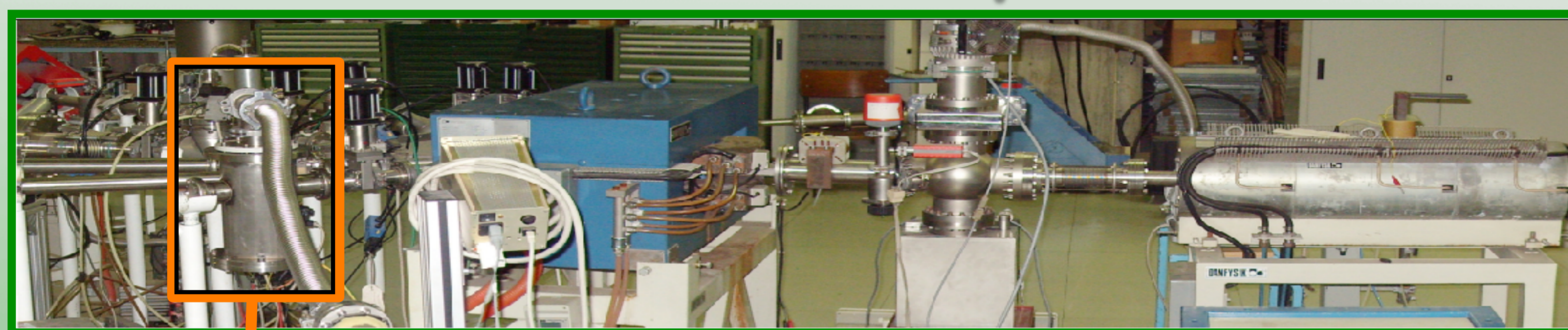
- photon-counting capability
- lower operation voltages
- lower TTS

Simulations



- Geant4-based simulations
- SiPM cell structure:
 - Si substrate (5mm)
 - Quartz layer (0.15 μm)
- Normally incident beam

Experimental setup



- Proton beam generated by TTT-3 Accelerator
- Electron beam obtained by stripping over ¹²C target
- Electrostatic mirror
- Electrostatic lenses to focus e⁻ beam on MCPs
- SiPM test

Conclusions and Perspectives

A 7 keV electron beam has been extracted and measured by MCPs.

The next step will consist in obtaining a 10 keV focused electron beam in order to perform the full characterization of a S10943-8702 MPPC by HAMAMATSU (special non-windowed series) as an electron detector.