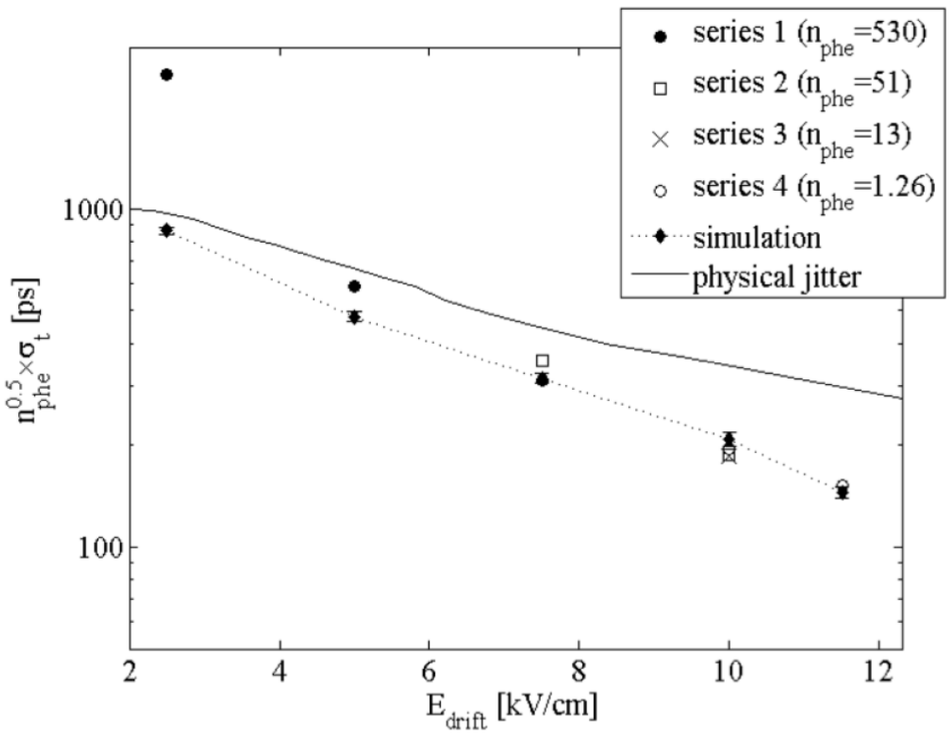
GDD generic R&D activities

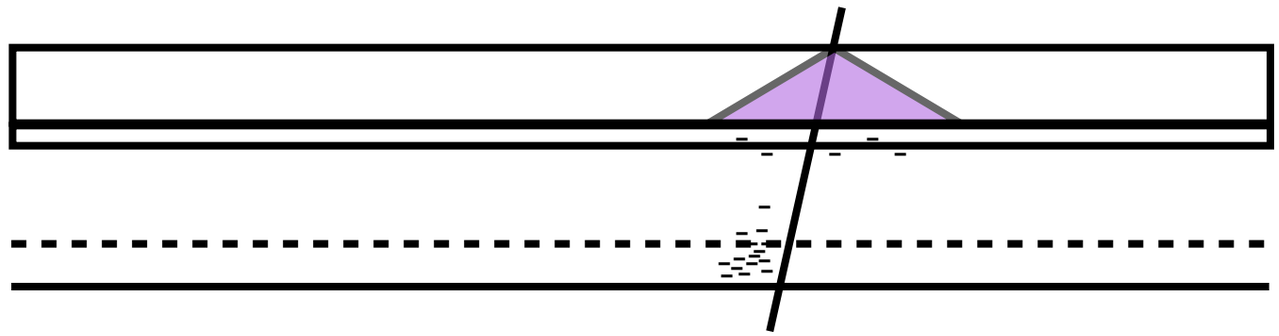
Collaboration with Saclay and Princeton

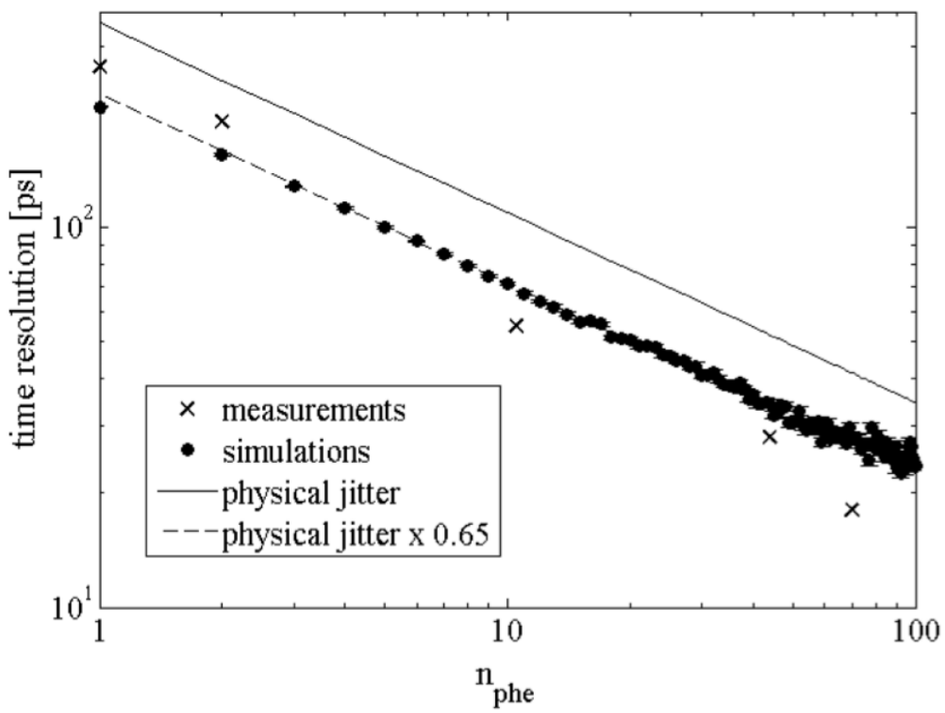
Fast timing with MM

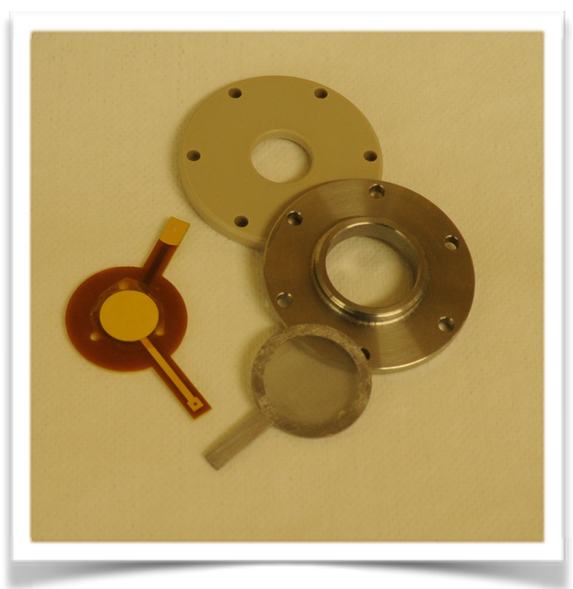


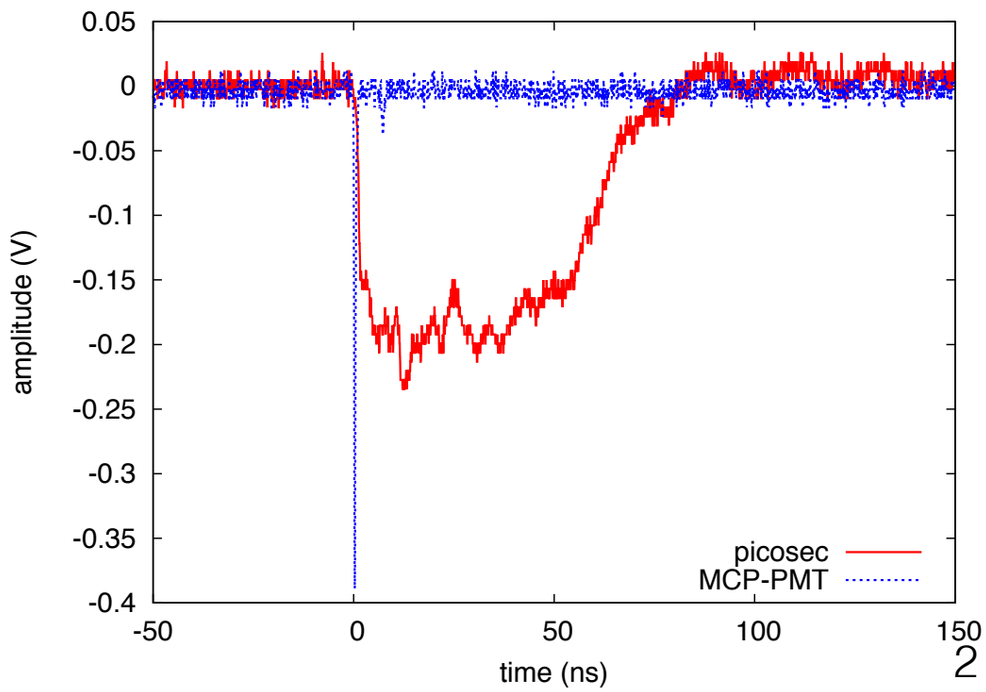
Aim at < 50ps resolution
- Cherenkov radiator
- Photocathode
- 200um drift
- MicroMeGas

R&D on:
- photocathode protection
- photocathode alternatives
- Secondary emitter materials

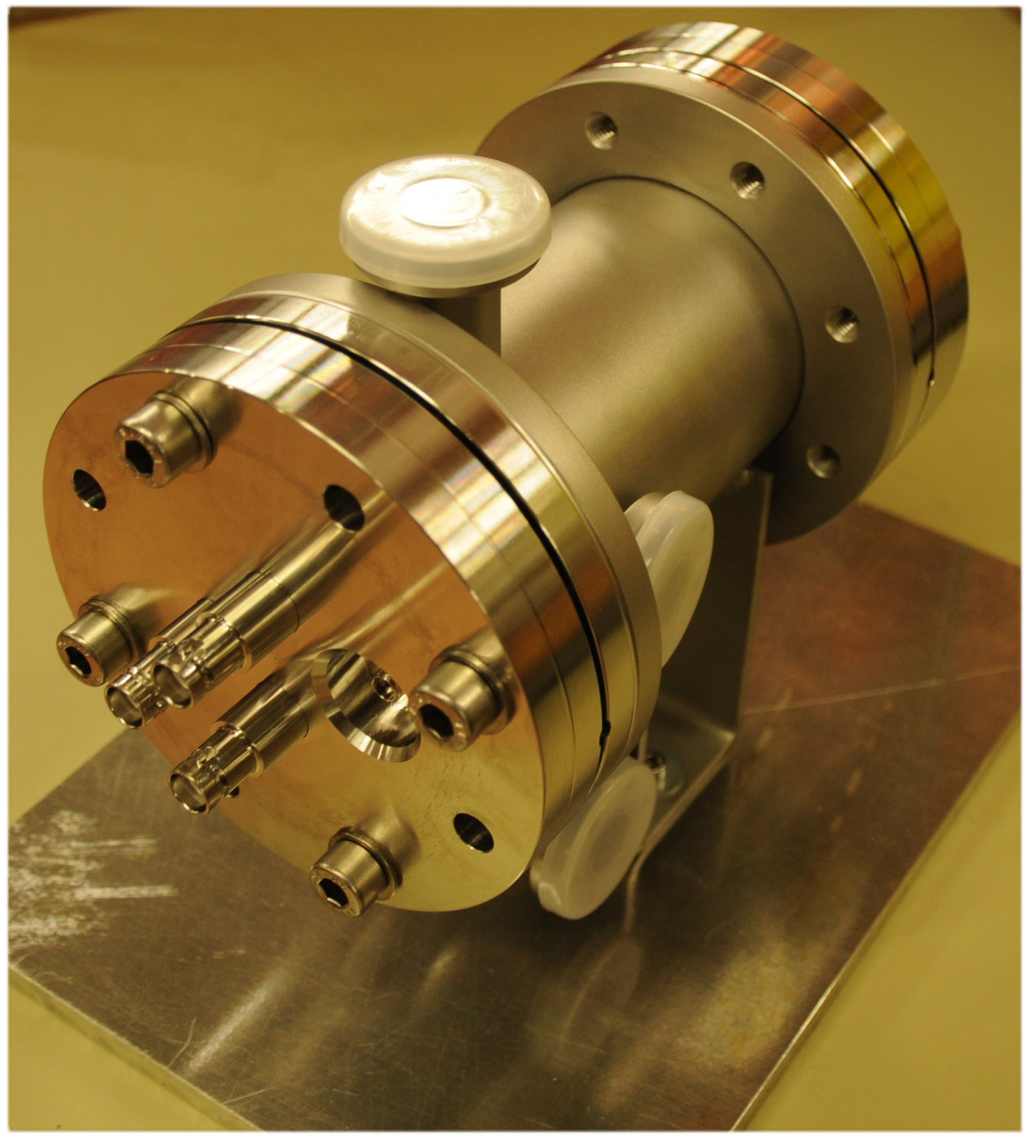


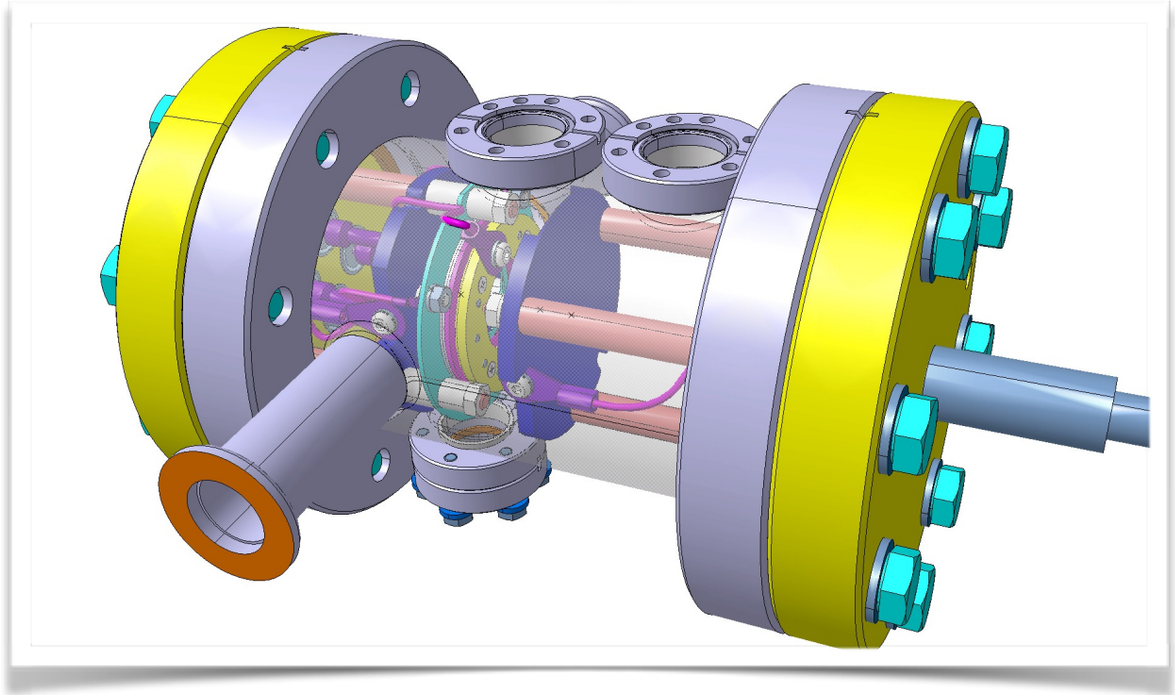




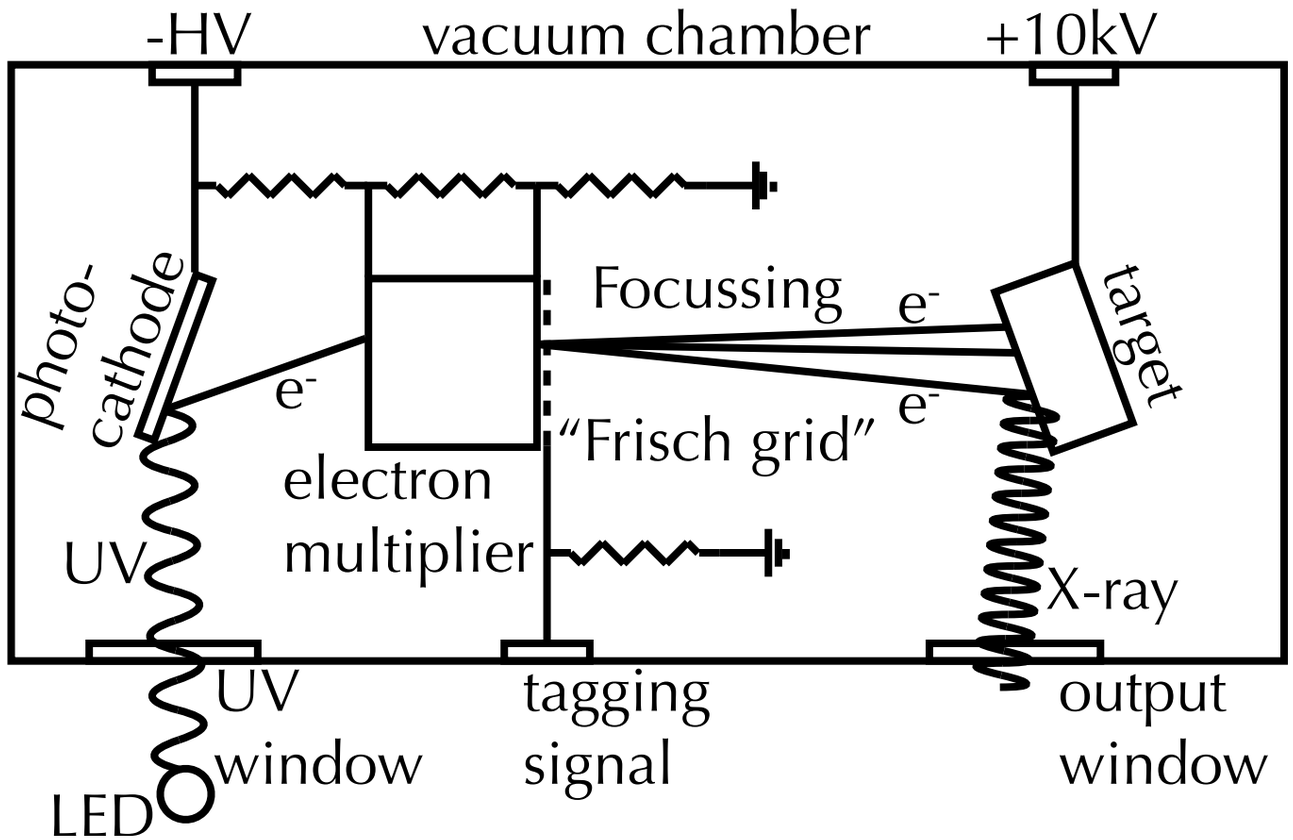


Triggered X-Ray

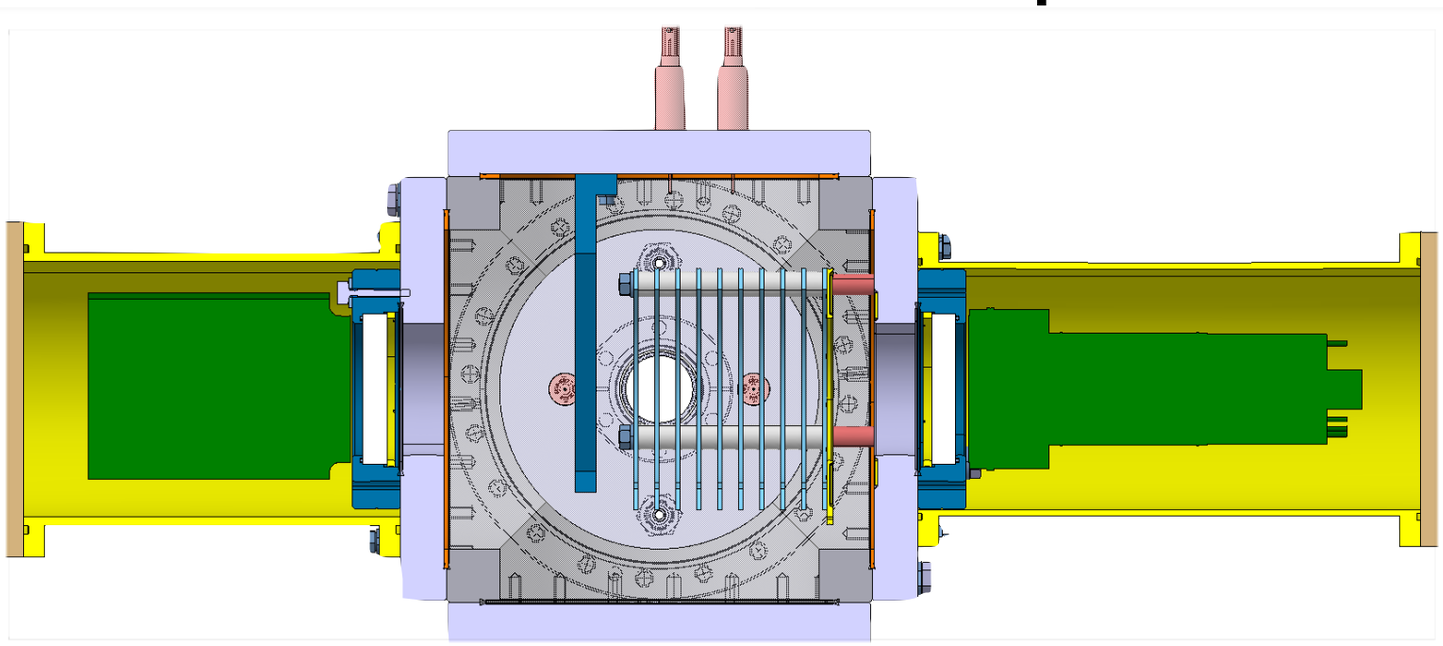




Time resolved X-ray source
- Xray time tagging at 100ps
- Fast intensity modulation
- Fast UV PMT

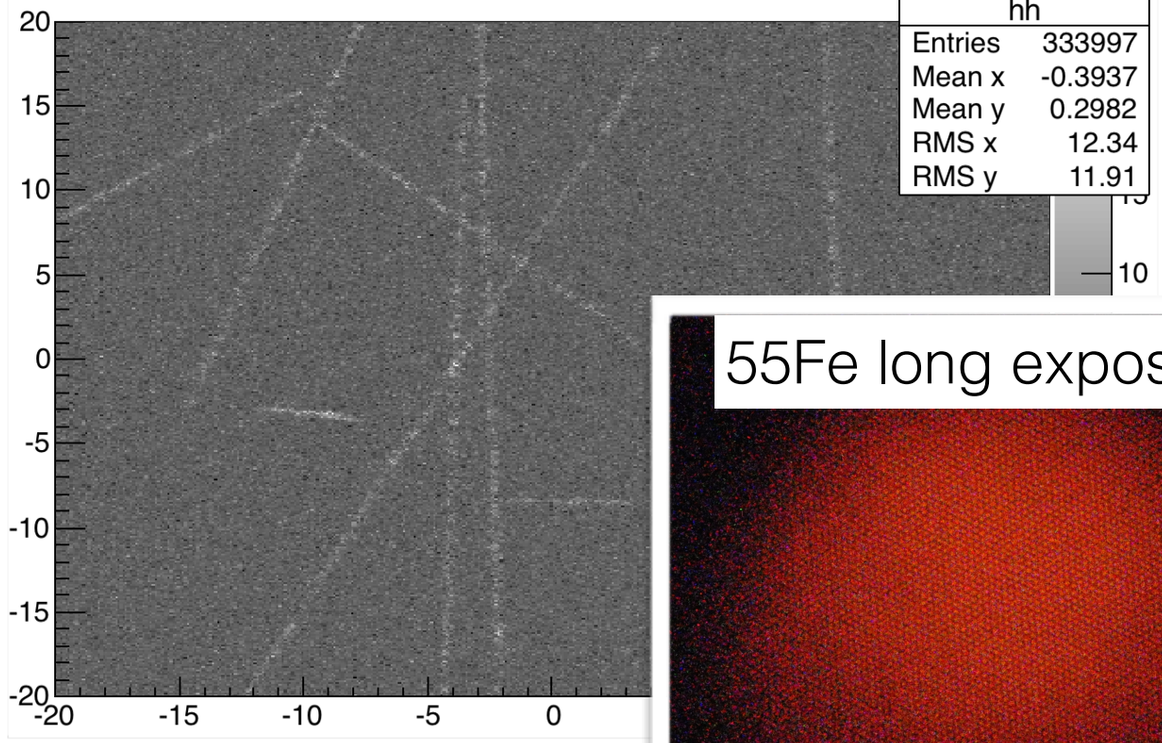


CCD optical readout



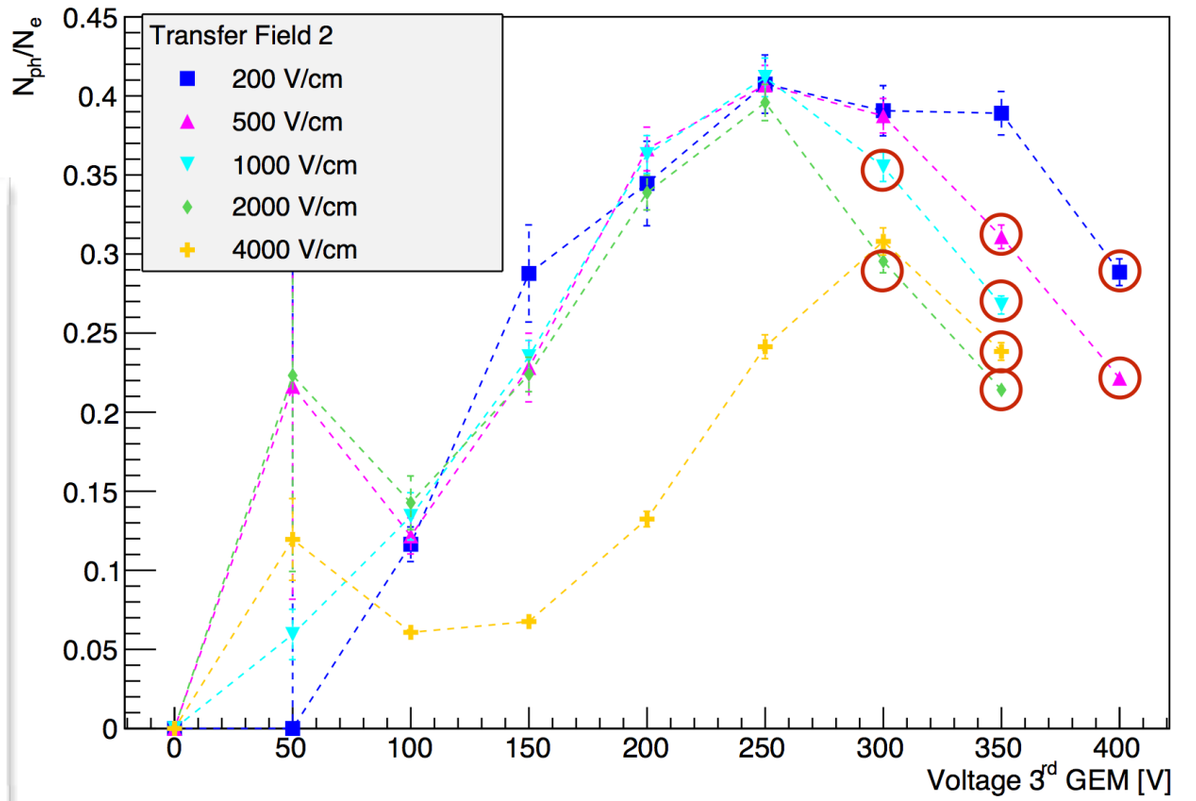
Study:
- Visible (near UV and near IR) scintillation of gasses
- Event topology study
- Imaging
- …

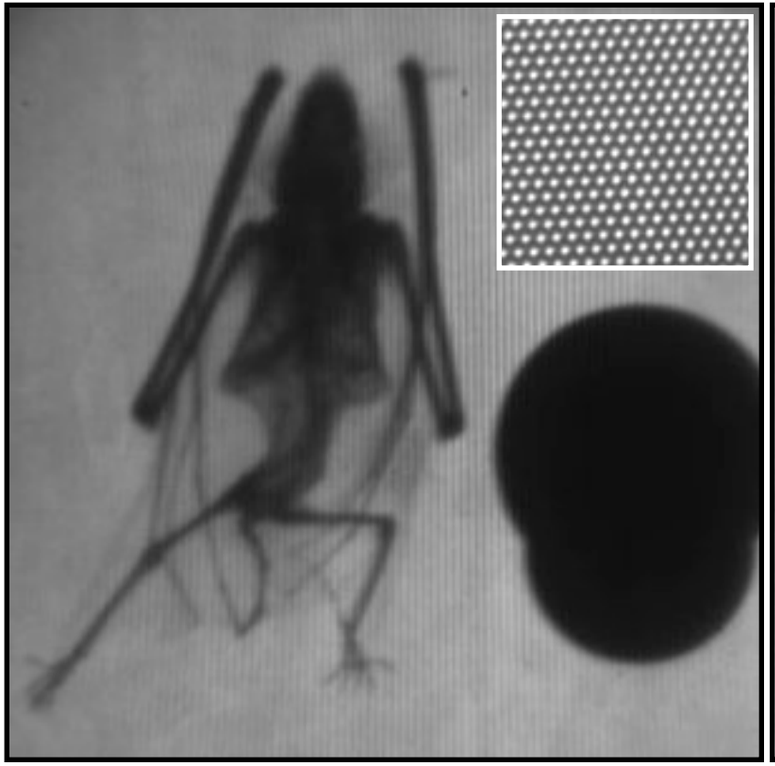
Simulation of muon tracks



55Fe long exposure

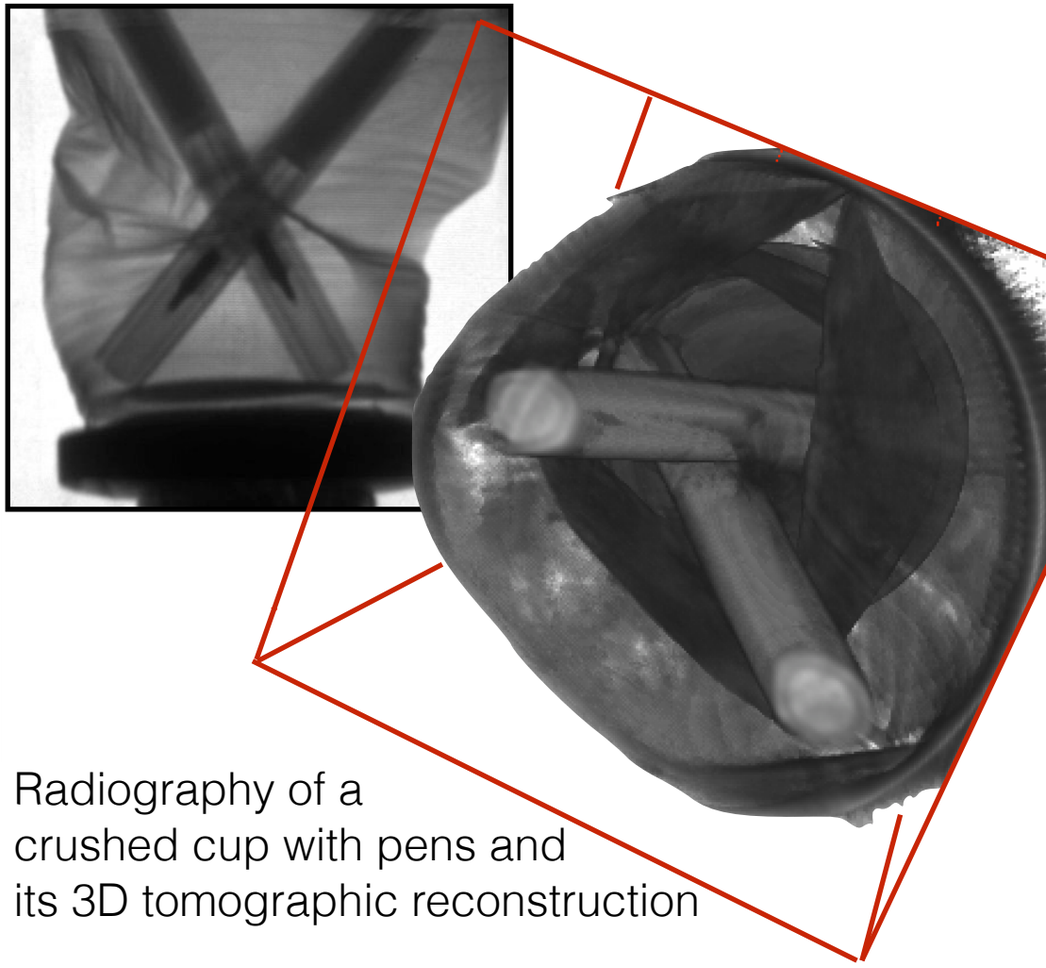
Ar/CF_4 80/20 secondary scintillation yield



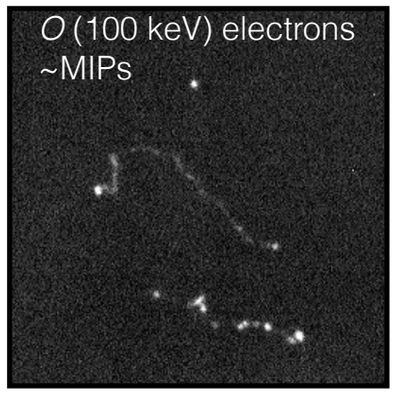


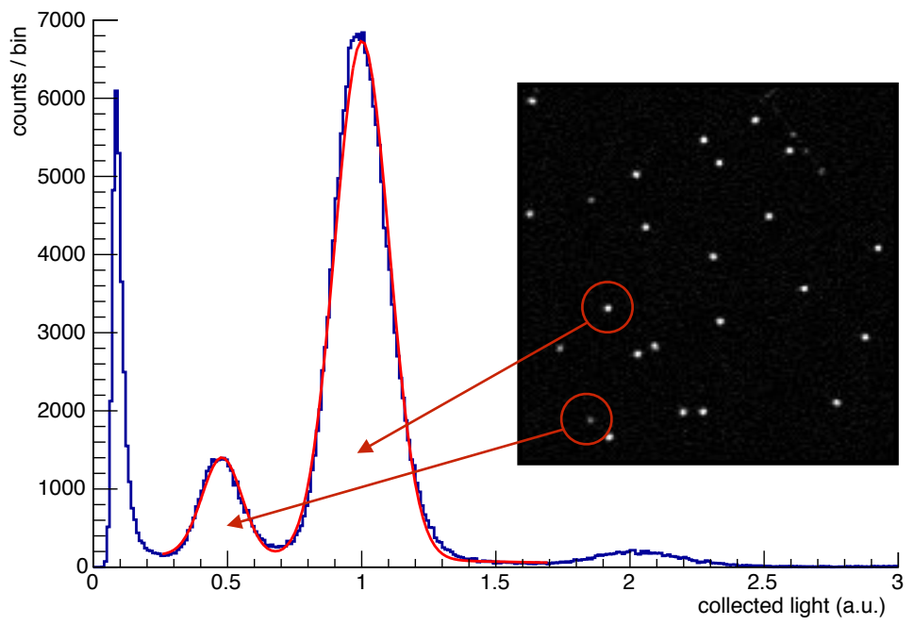
Radiography of a bat
and closeup of the GEM holes

Freeze-frame of an X-ray
movie of a flying drone

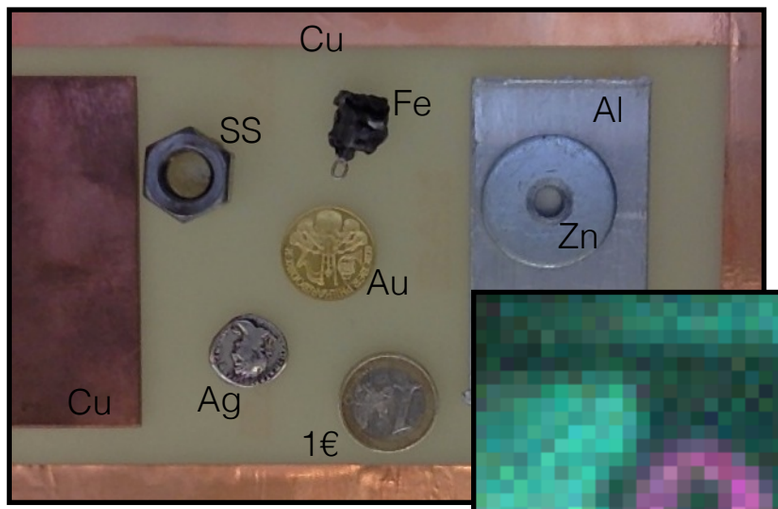


Radiography of a
crushed cup with pens and
its 3D tomographic reconstruction

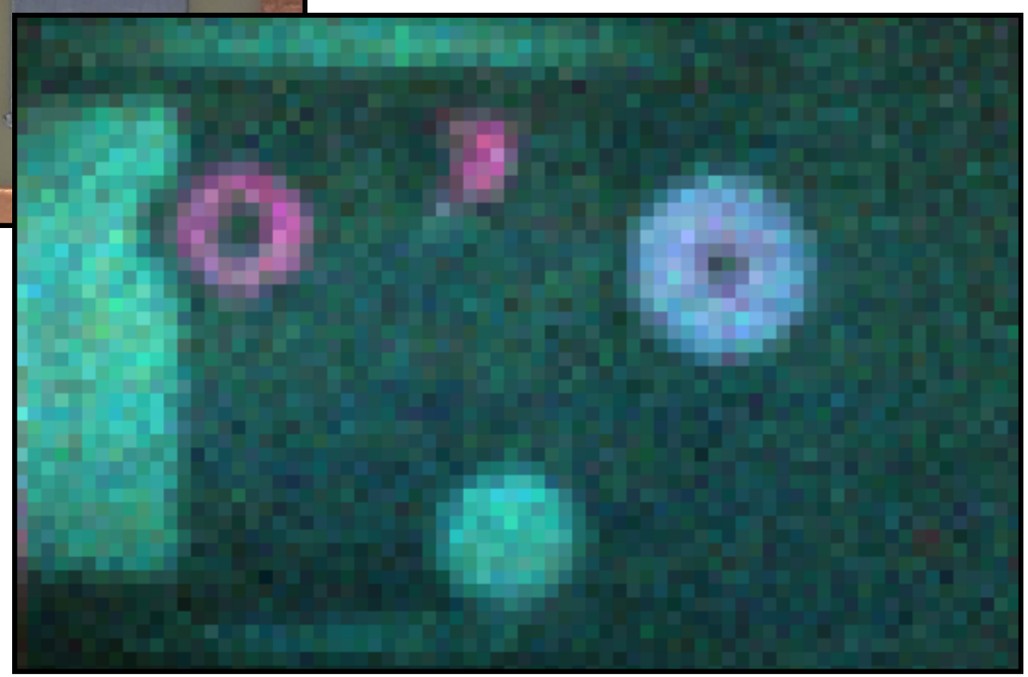




Single X-rays from ^{55}Fe
and the energy spectrum
extracted from the images



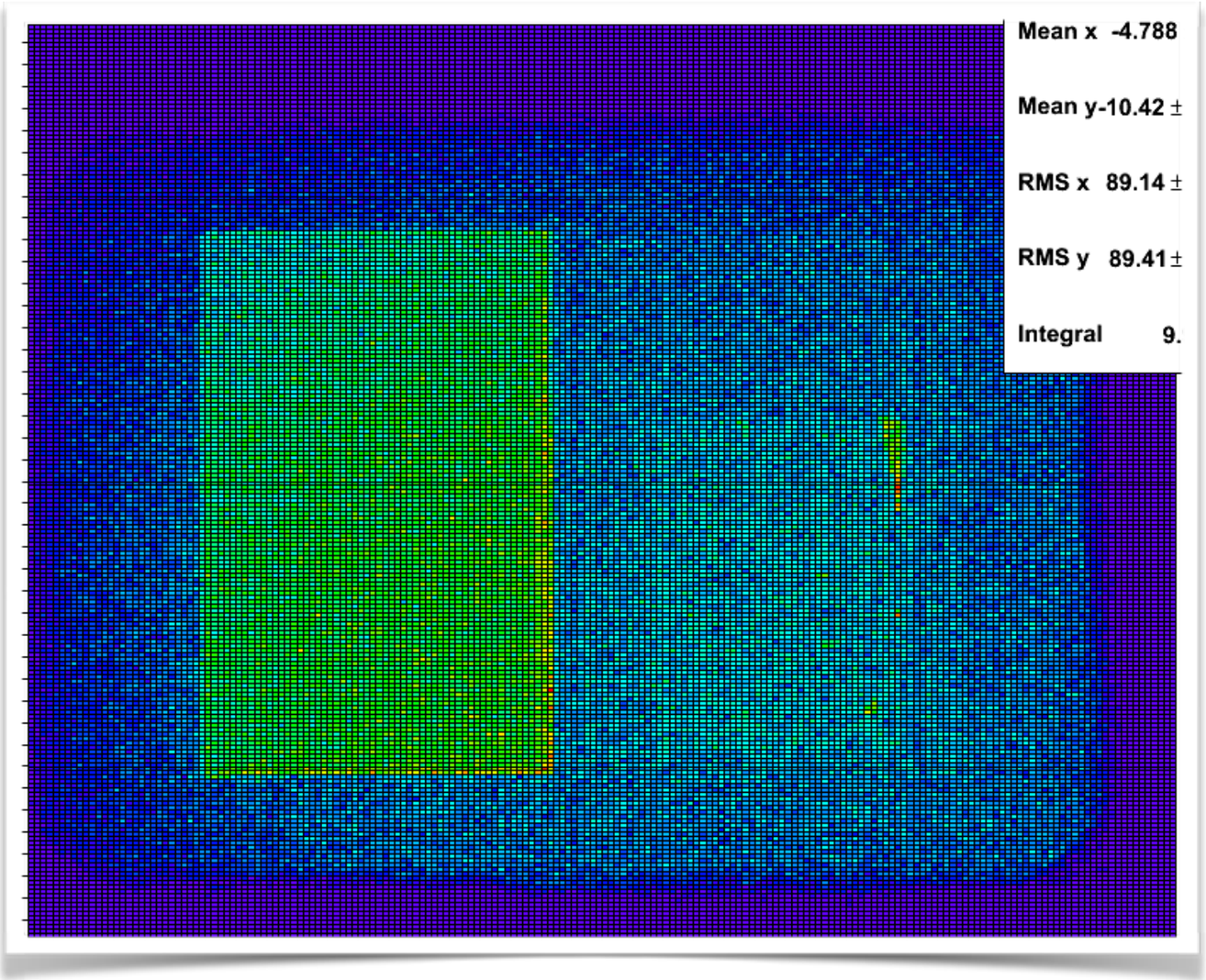
Visible picture of a *painting*
and its X-ray fluorescence image.
Different colours refer to different
materials (energy resolved)



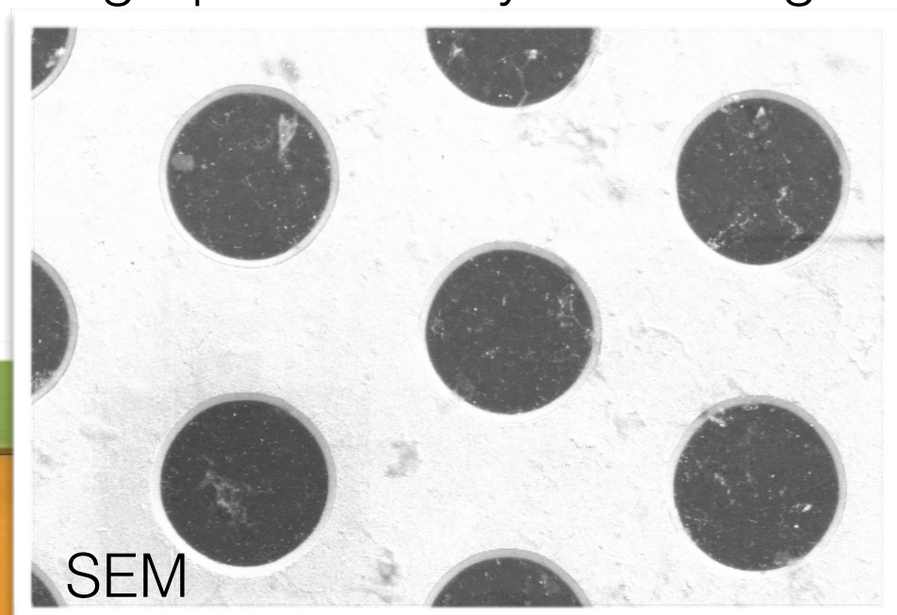
Collaboration with UCL

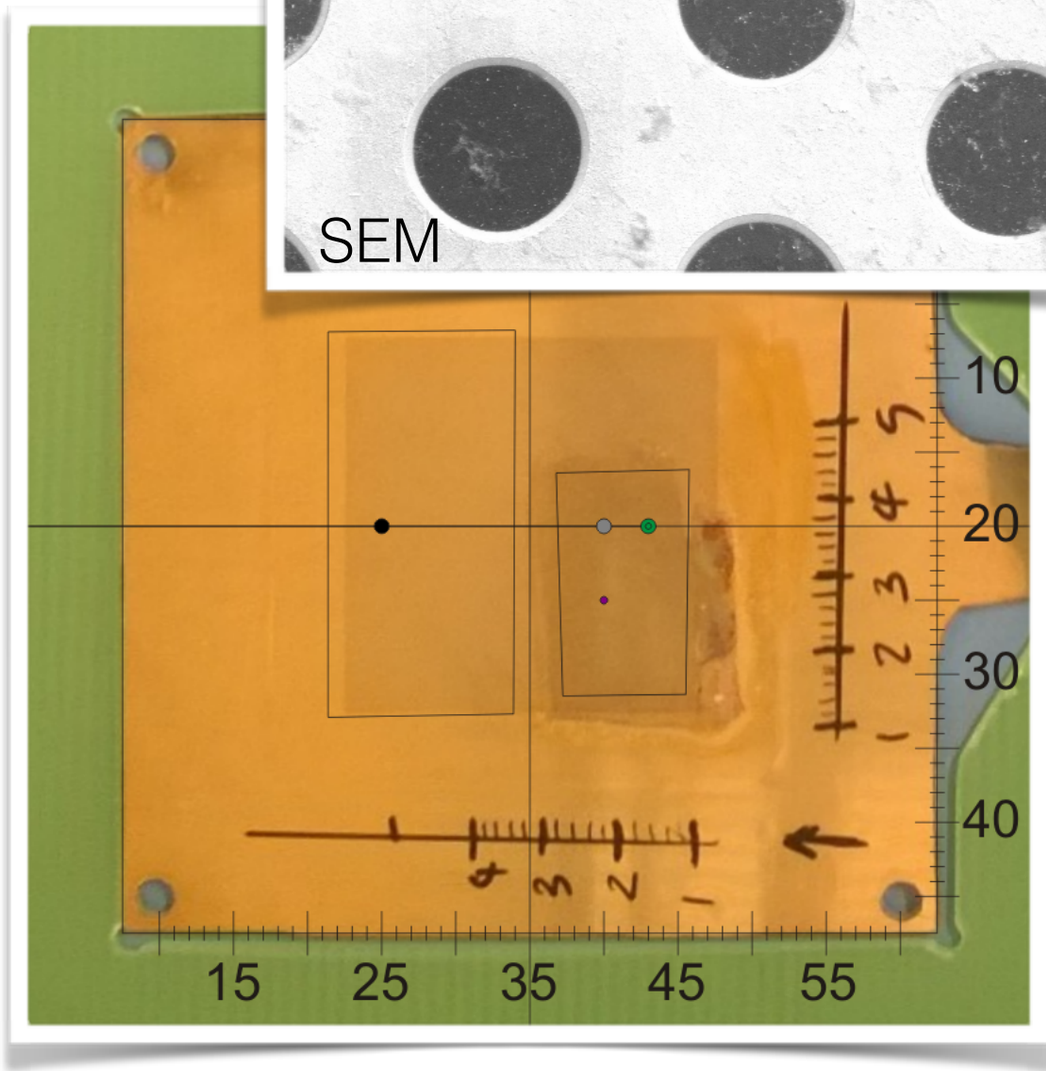
Graphene

Membrane opaque to ions and transparent to electrons
- solution of the ion back-flow in gaseous detectors
- protective layer on photocathodes
- enhancement of electron emission

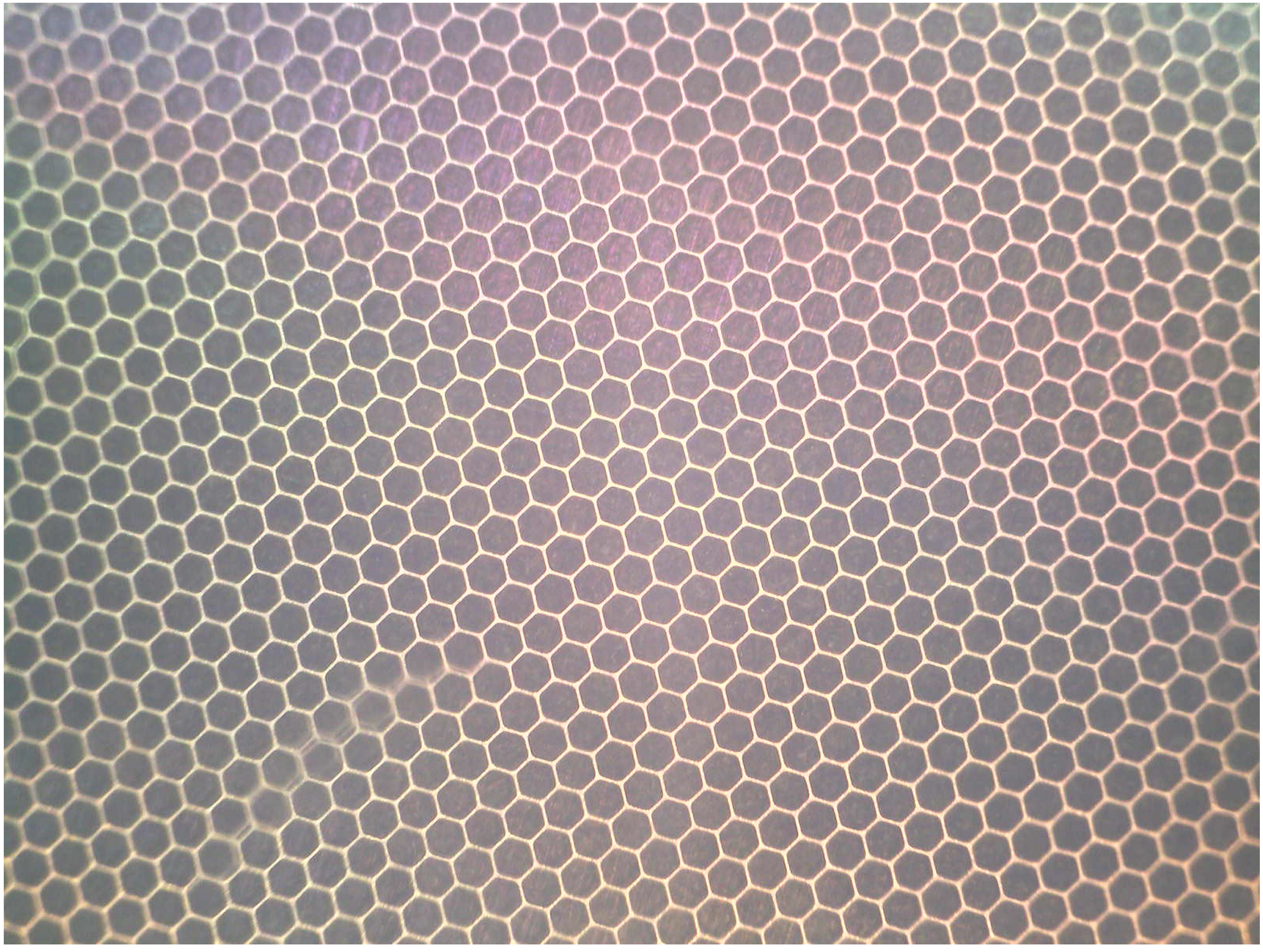


~99% (suspended)
graphene tri-layer coverage



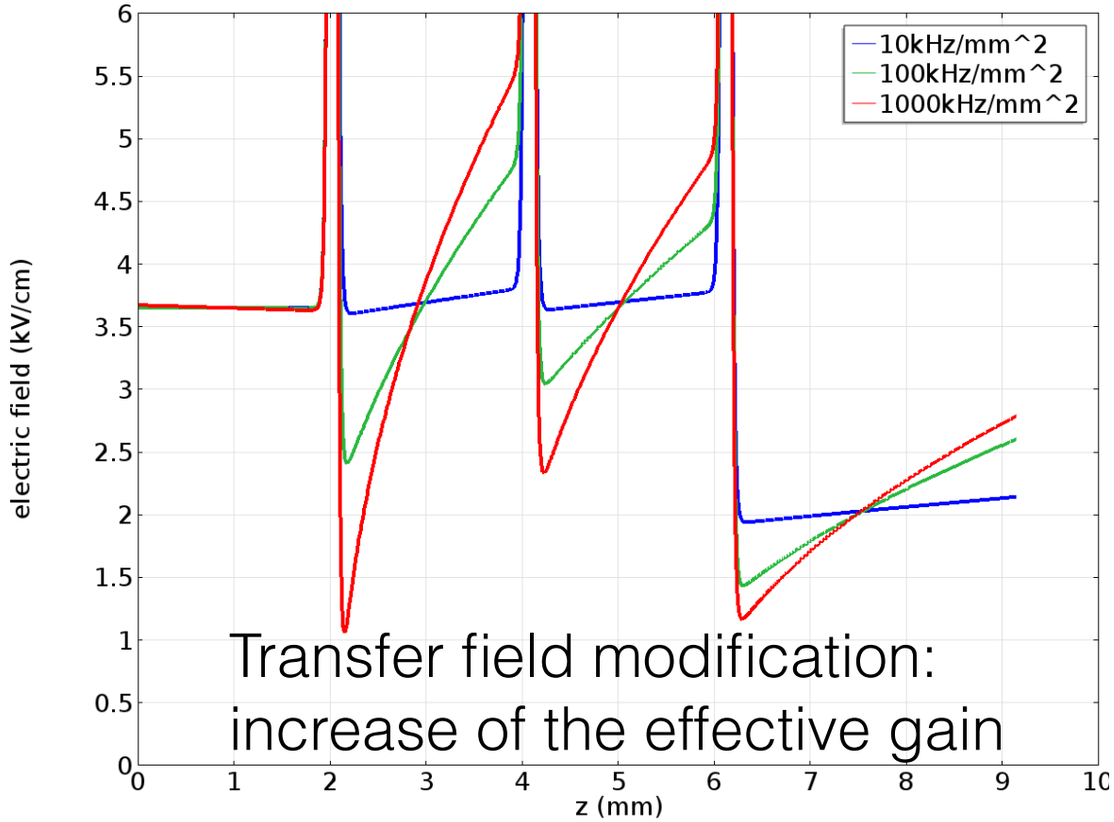


“Transparent” GEM

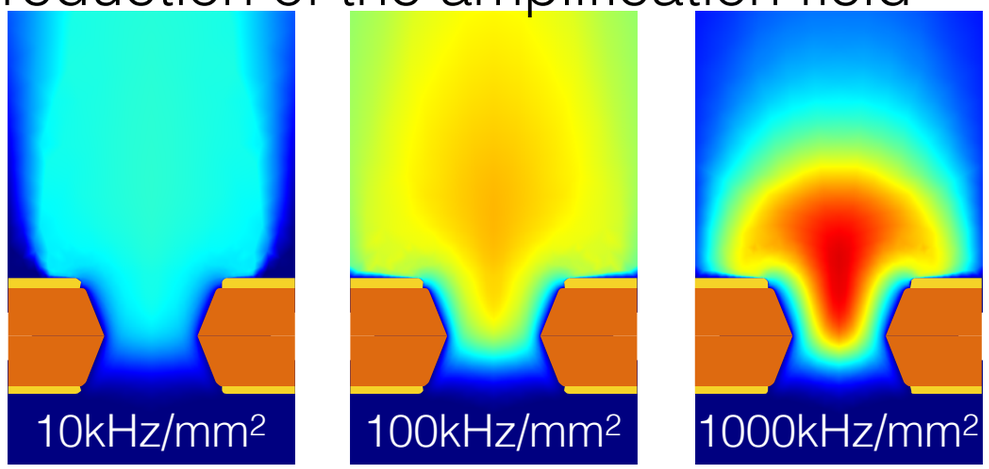


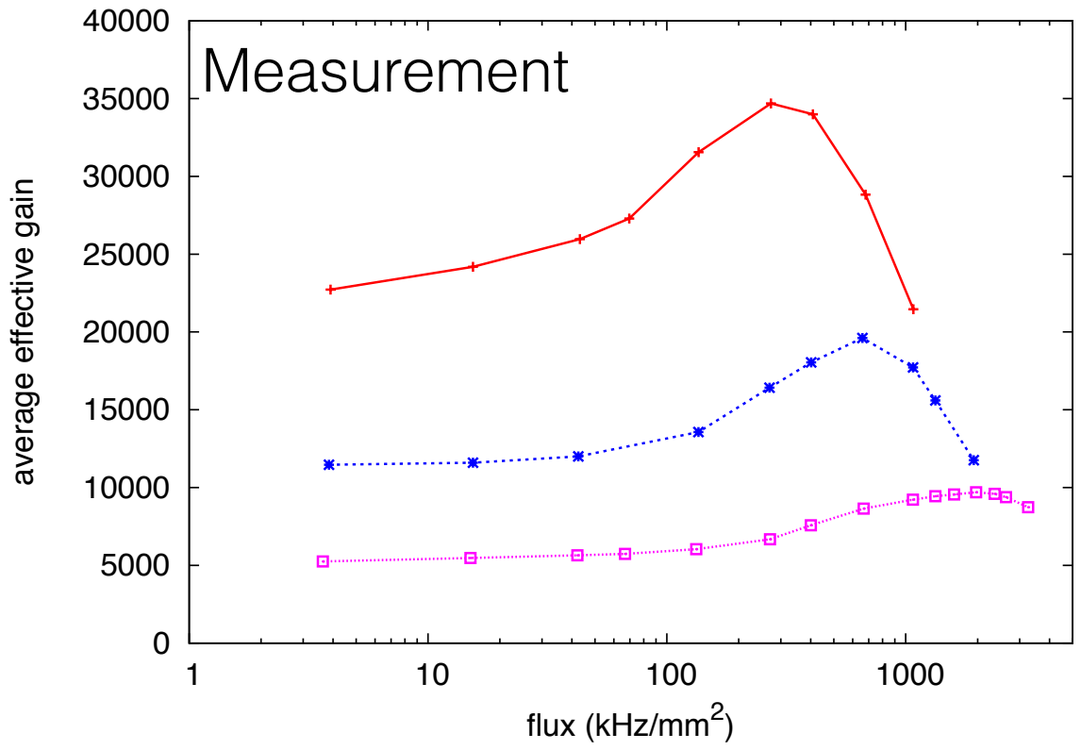
Ion density effects

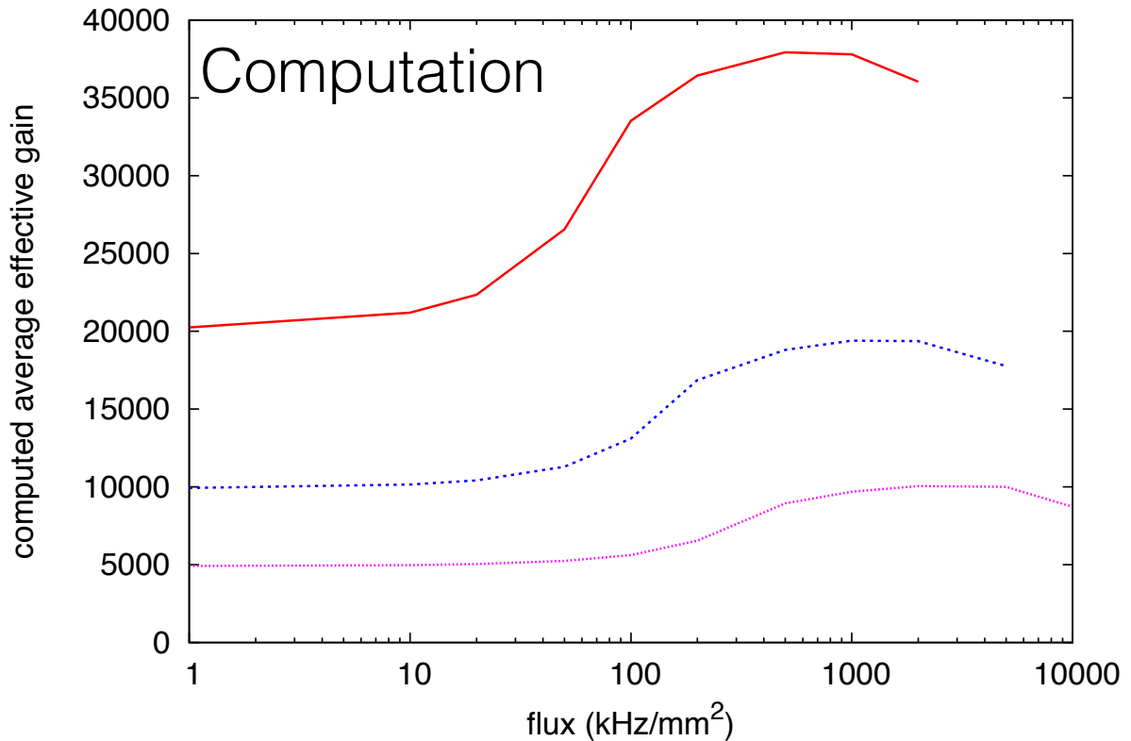
Ion charges instantaneously modify the electric fields



Ion distribution at the hole entrance:
reduction of the amplification field





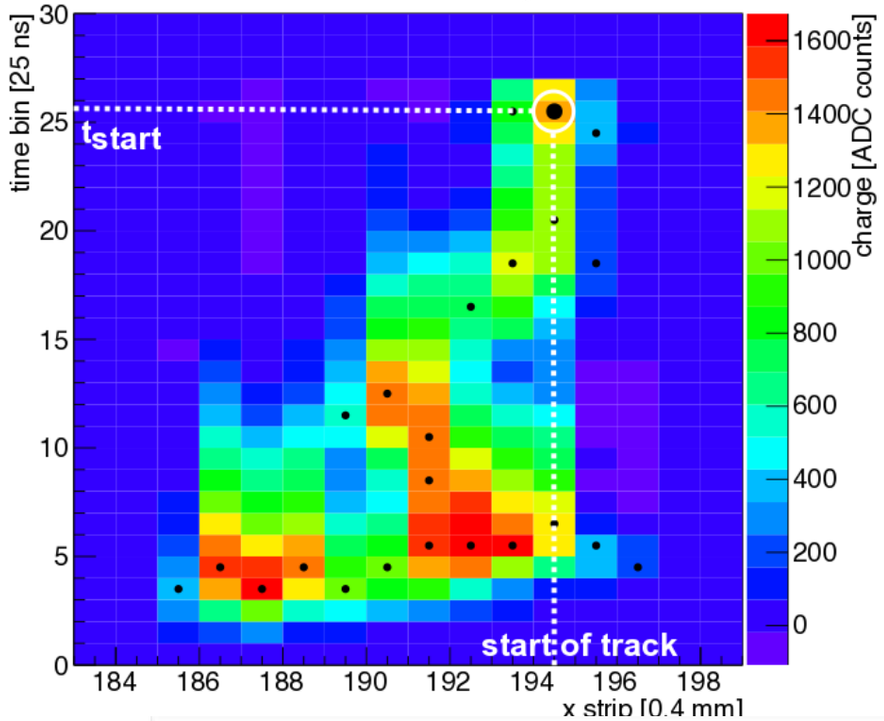


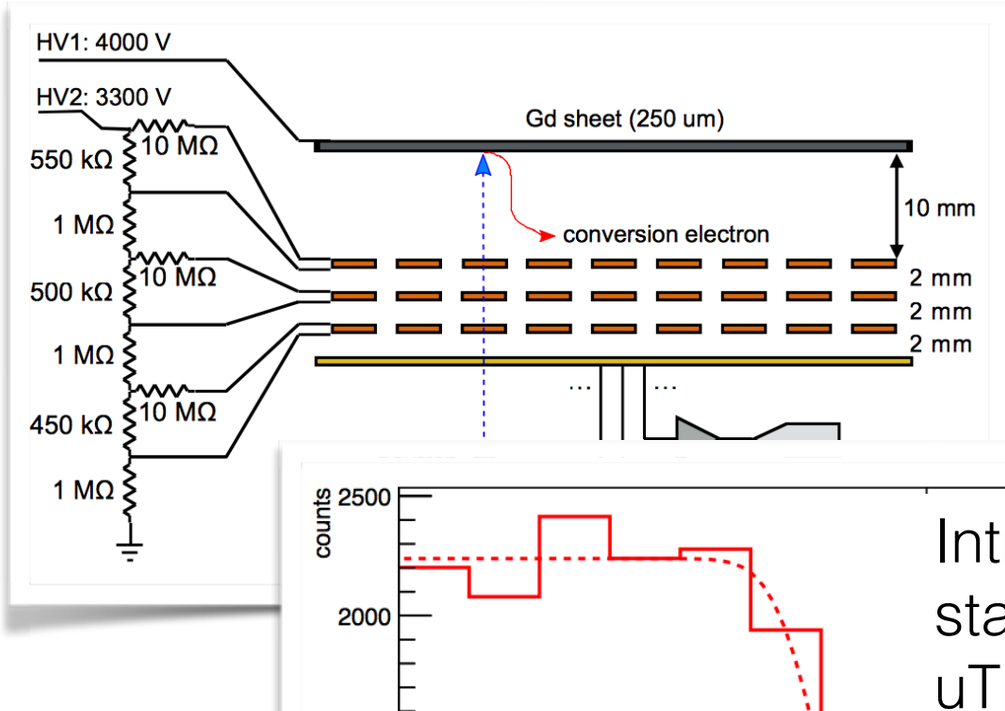
Collaboration with ESS

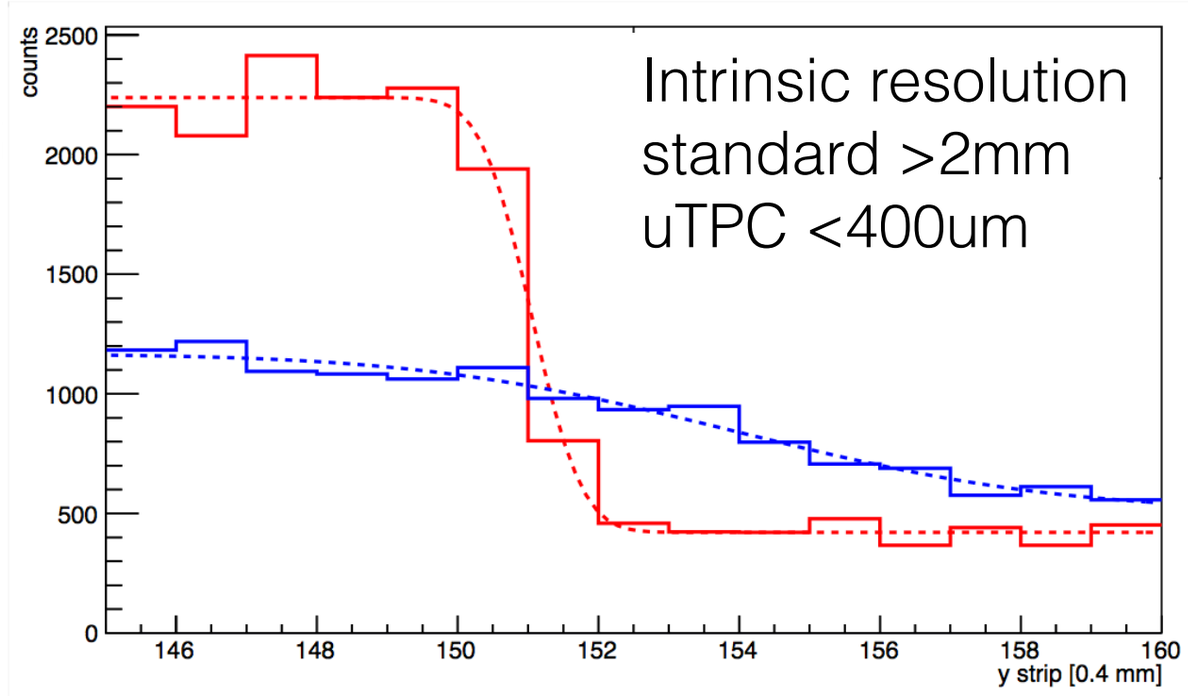
Neutron detectors

Supported by BrightnESS H2020

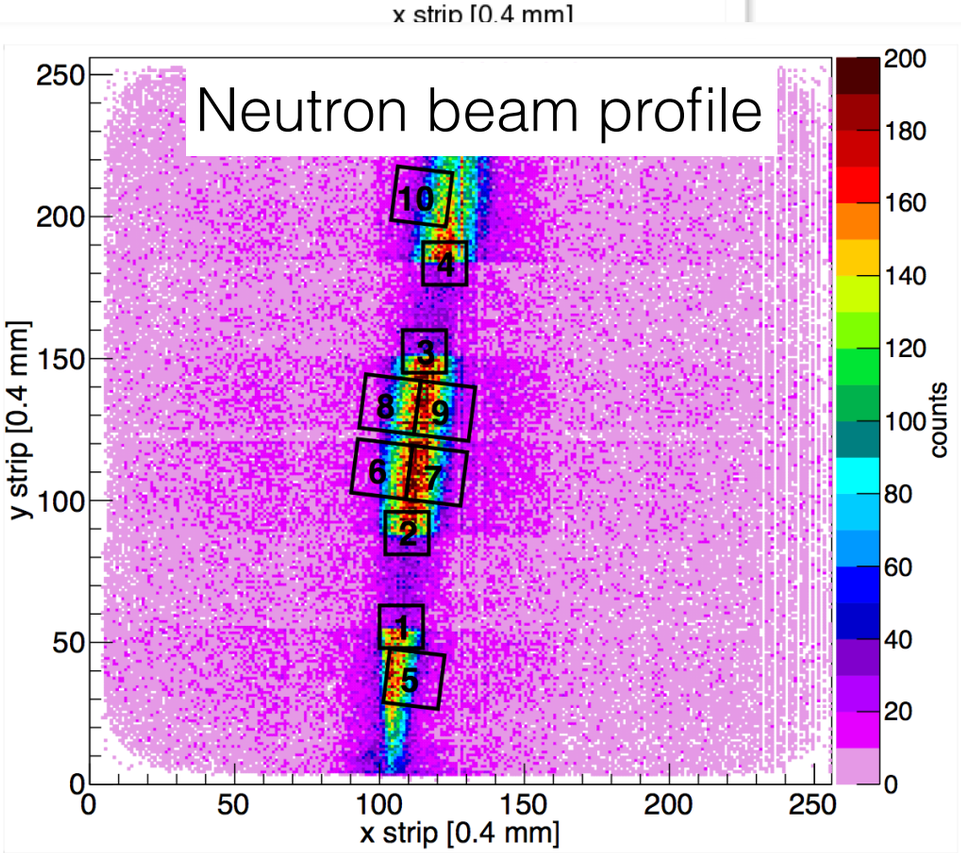
Electron curly track







Intrinsic resolution
standard >2mm
uTPC <400um

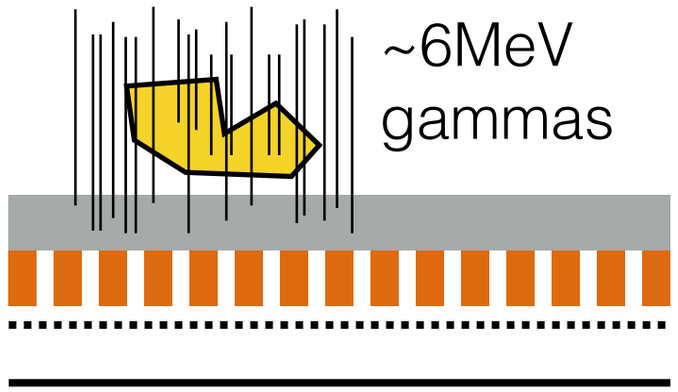


NMX instrument at ESS:
- Gd converter (high efficiency)
- Triple GEM (high flux capability)
- TPC analysis (improved resolution)

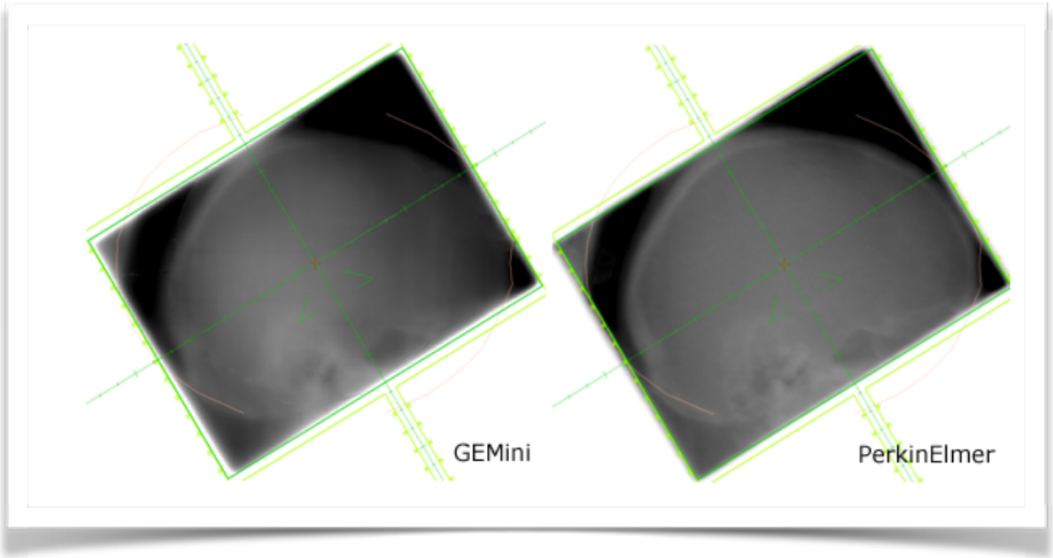
Collaboration with Swedish company

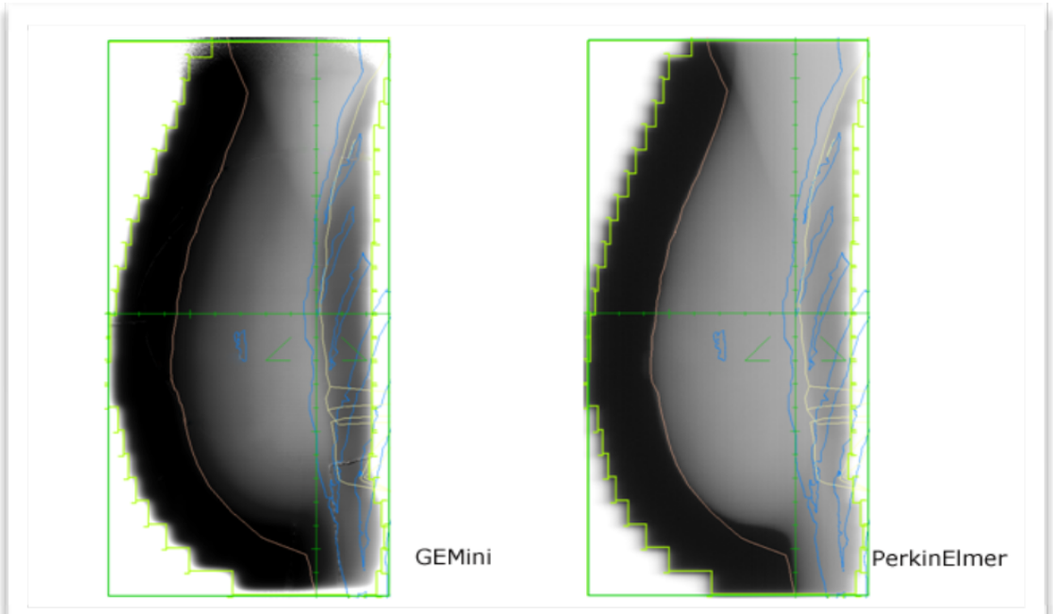
Imaging for medical applications

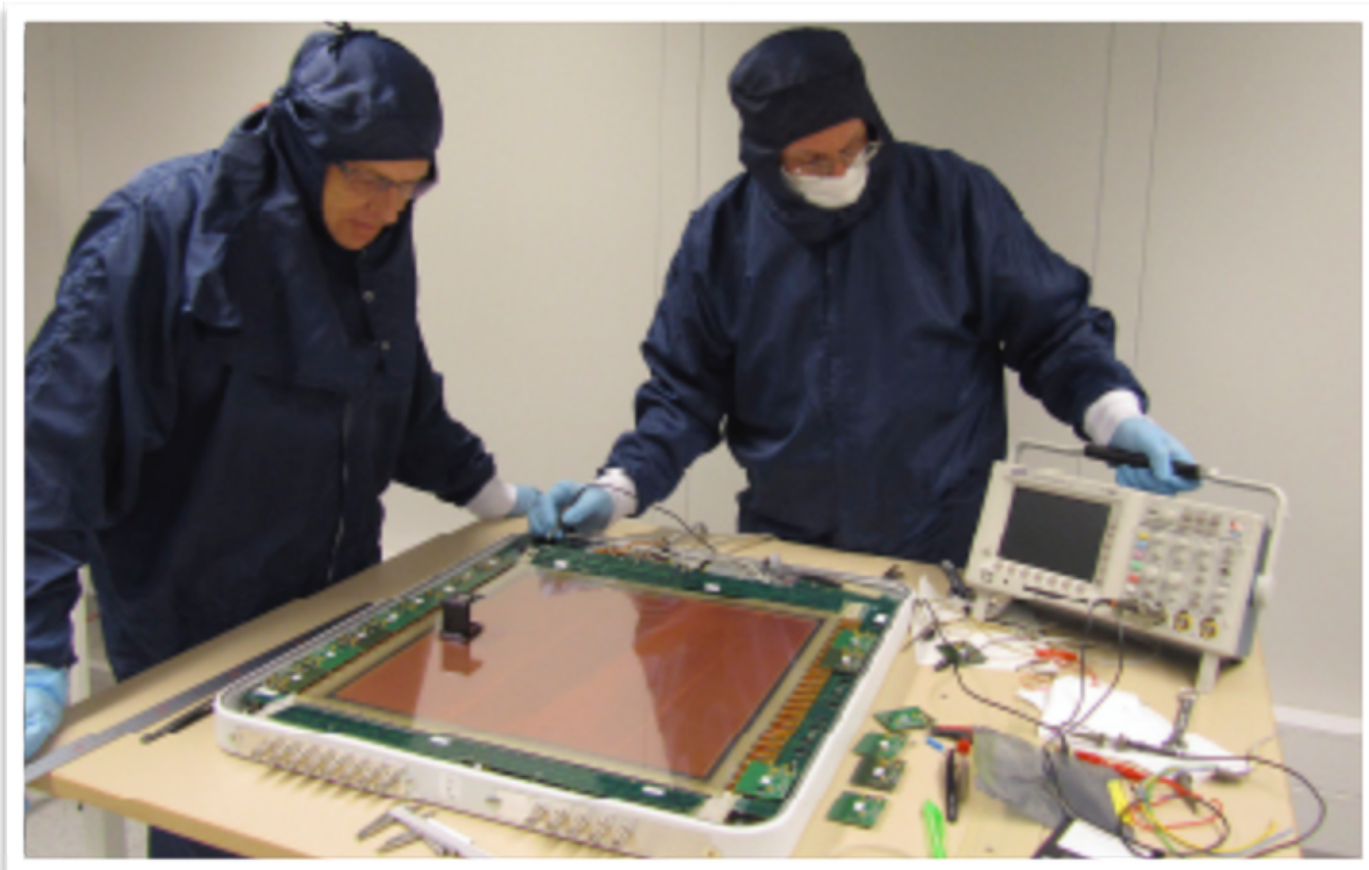
Collaboration with a Swedish company
Gamma imaging and dosimetry based on GEMs



- Converter
- Collimator
- GEM
- Readout



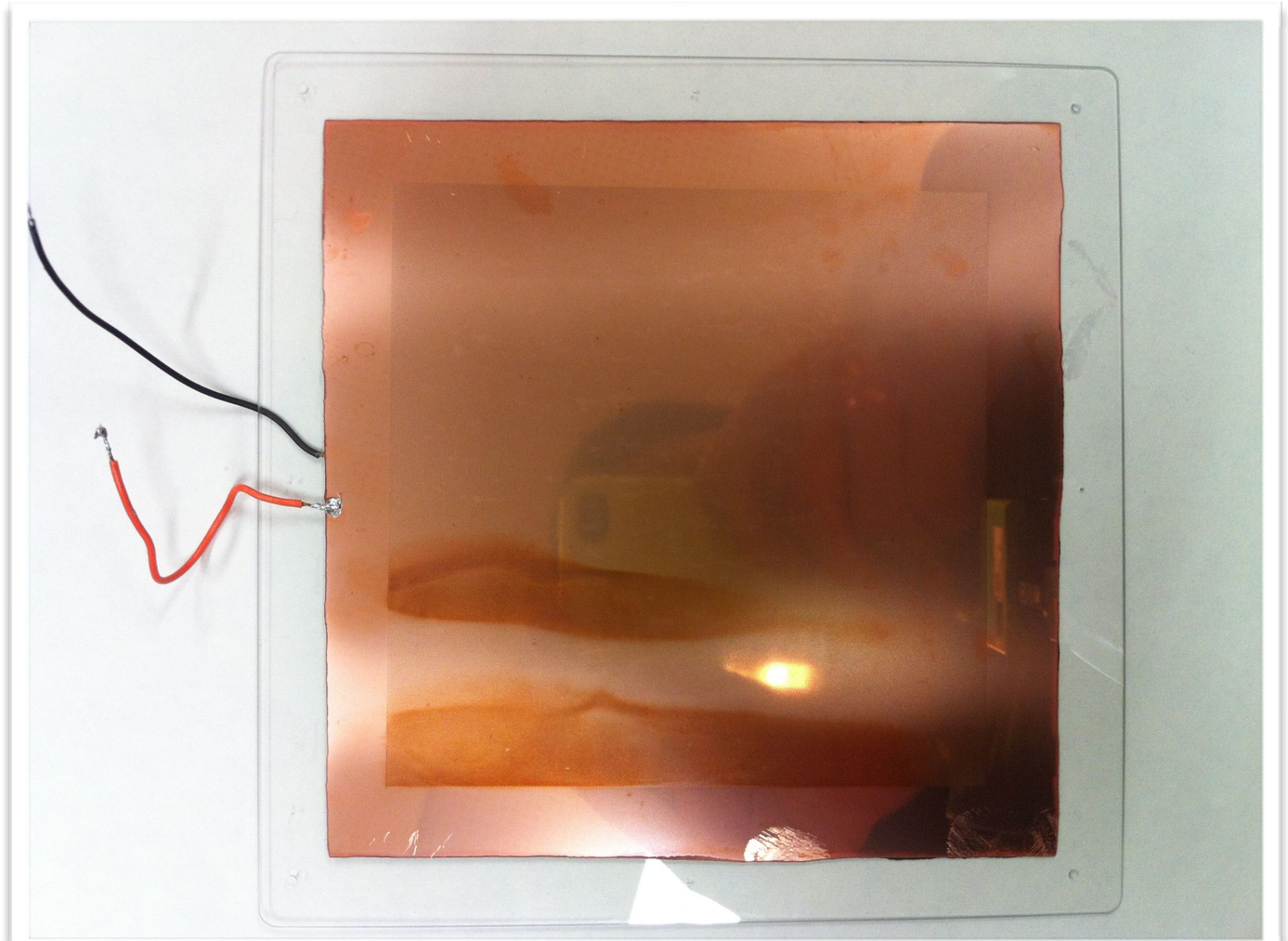




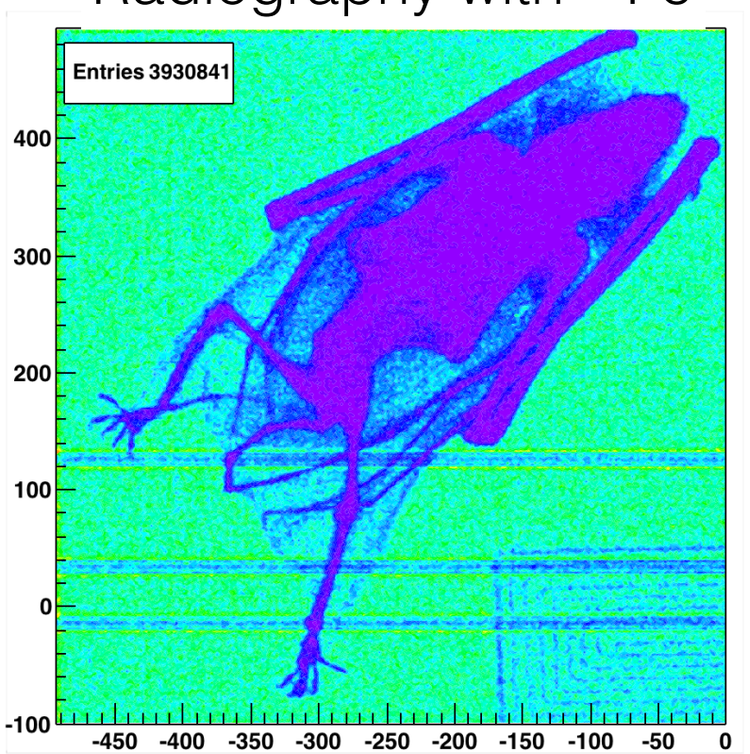
Collaboration with Tokyo University

Glass GEM

Photo Etchable Glass 3 (PEG3):
Rigid (self sustained structure)
‘Laser assisted etching’ opens new possibilities
Slightly conductive (milder charge-up)
Clean and low outgassing (sealed operation)



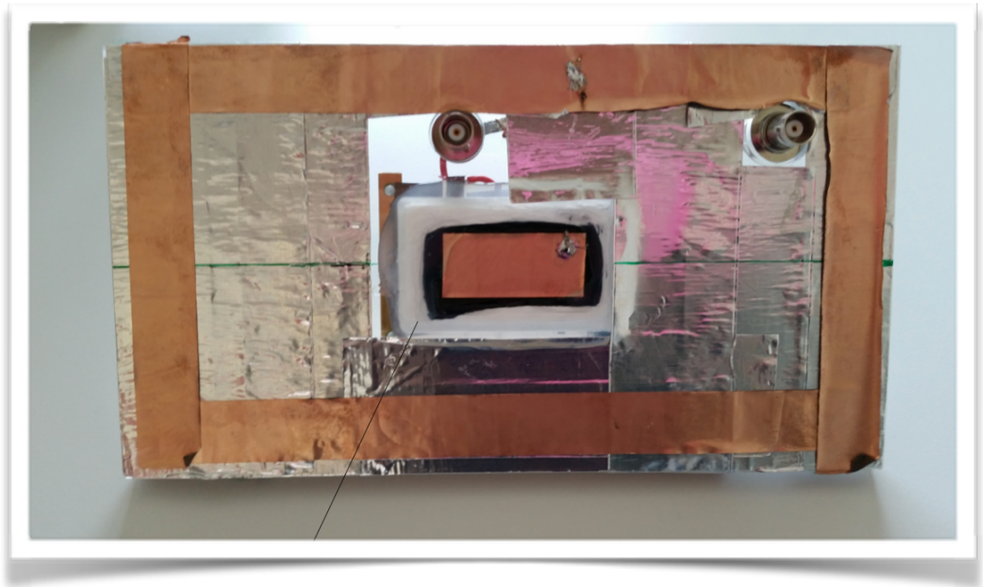
Radiography with ^{55}Fe

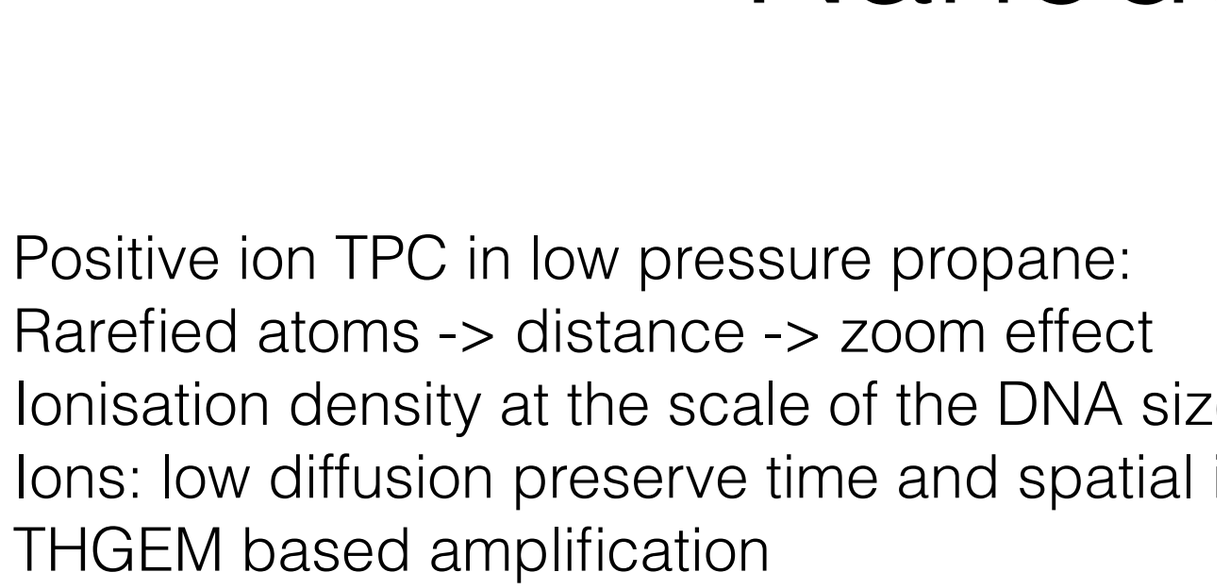


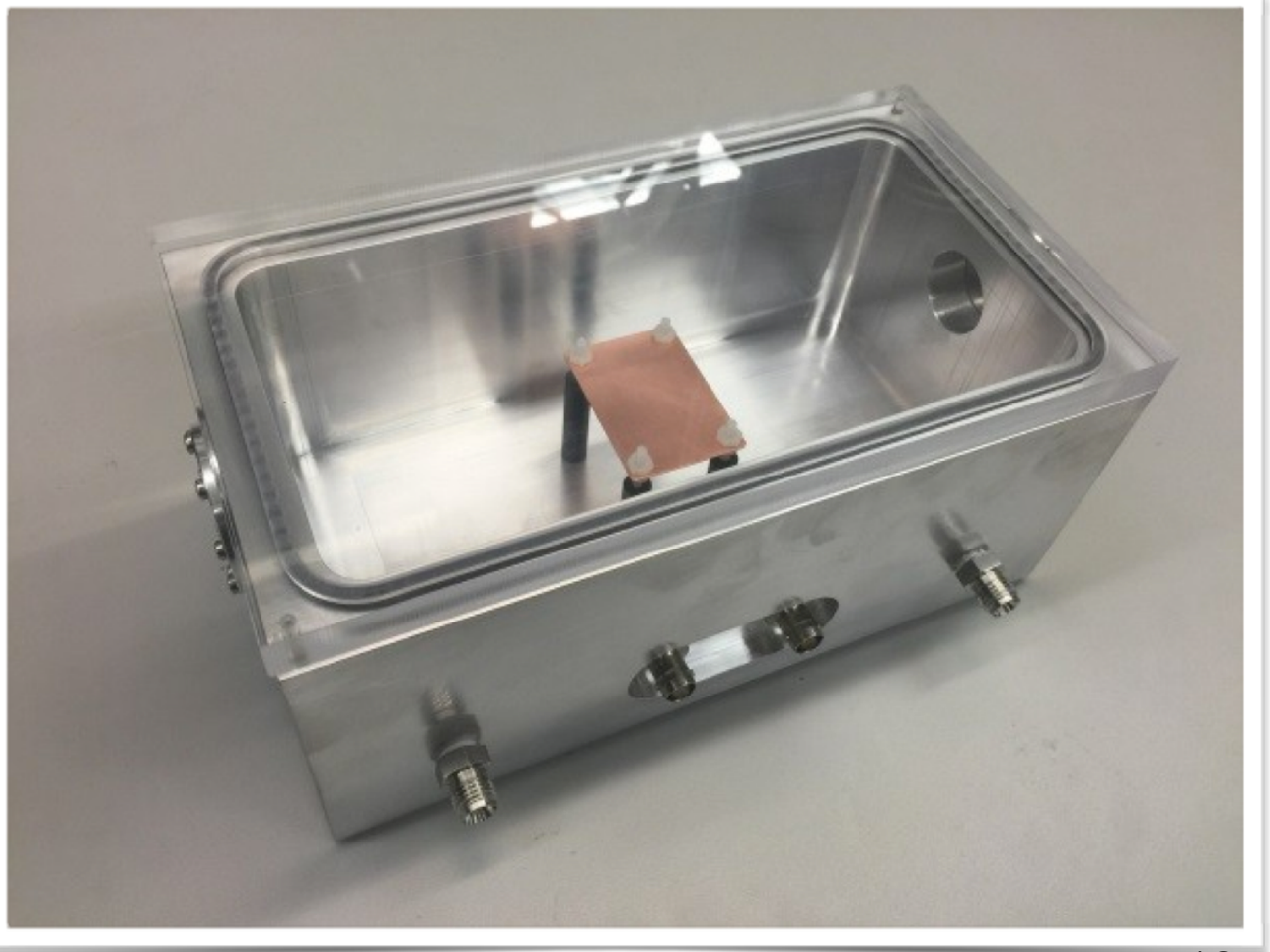
Collaboration with PSI

Nanodosimetry

Positive ion TPC in low pressure propane:
Rarefied atoms -> distance -> zoom effect
Ionisation density at the scale of the DNA size
Ions: low diffusion preserve time and spatial information
THGEM based amplification







Vacuum chamber

UHV ensures:
- Environment control
- Ageing / contamination studies
- Outgassing / cleaning
- Sealed detector development