OPTICALLY READOUT PLANISPHERICAL GEM DETECTOR

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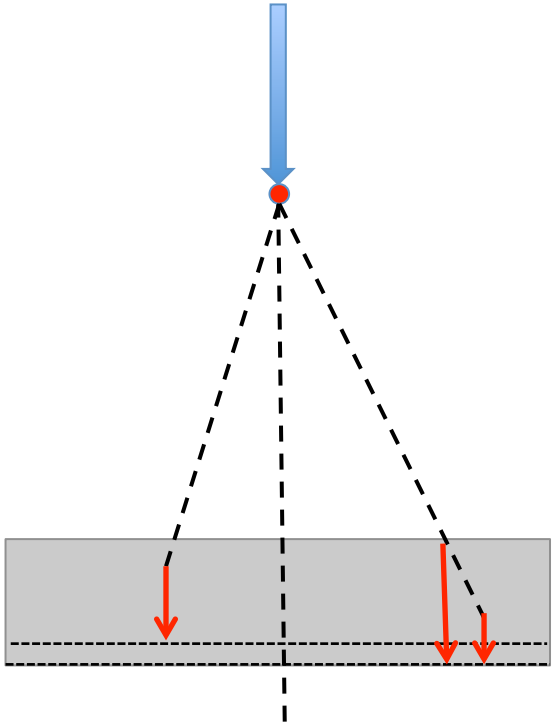
MPGD APPLICATIONS BEYOND FUNDAMENTAL SCIENCE
Aveiro, Portugal 12-16 September 2016

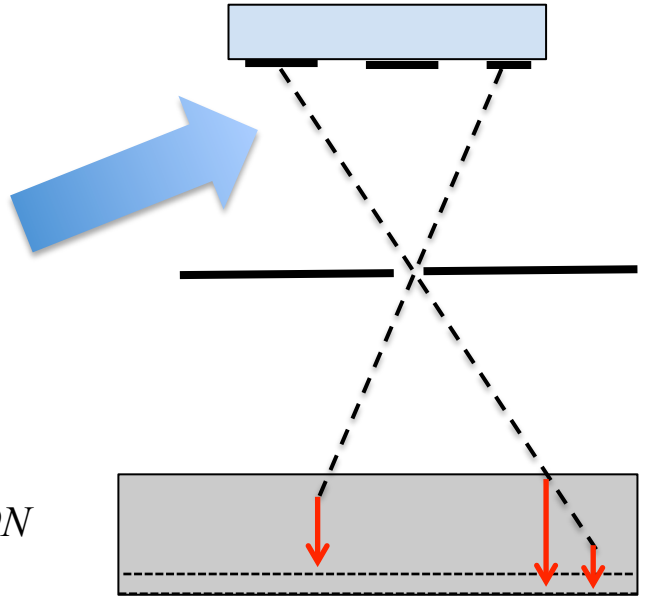
X-RAY IMAGING: PARALLAX ERROR

CRYSTAL DIFFRACTION



APPLICATIONS:
MACROMOLECULES AND
PROTEIN STRUCTURE

PINHOLE CAMERA



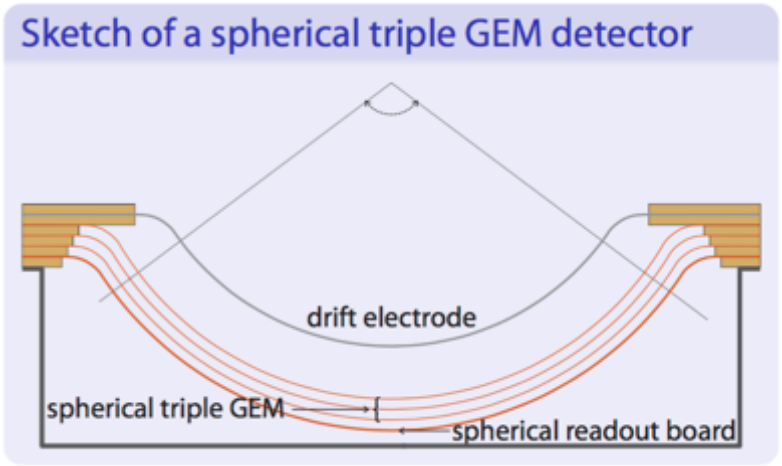
APPLICATIONS:
MATERIALS SCIENCE
FLUORESCENCE ANALYSIS

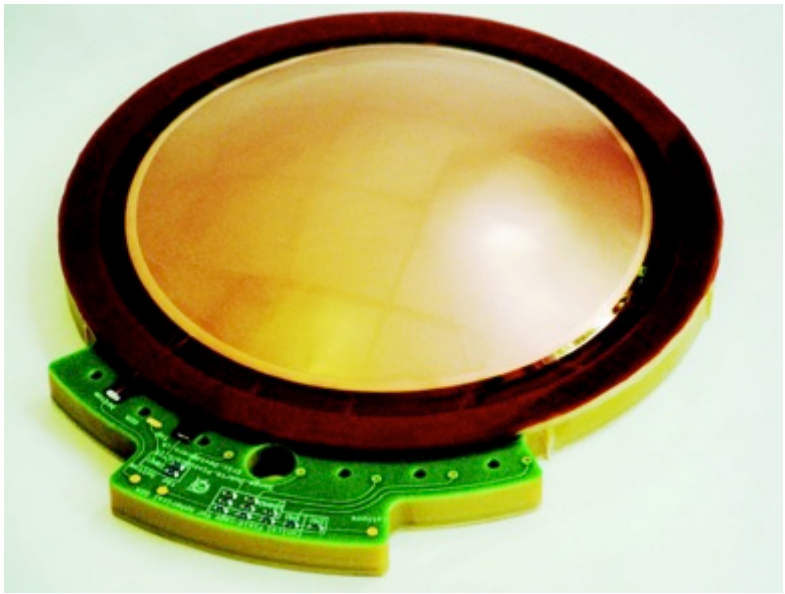
CONVERSION

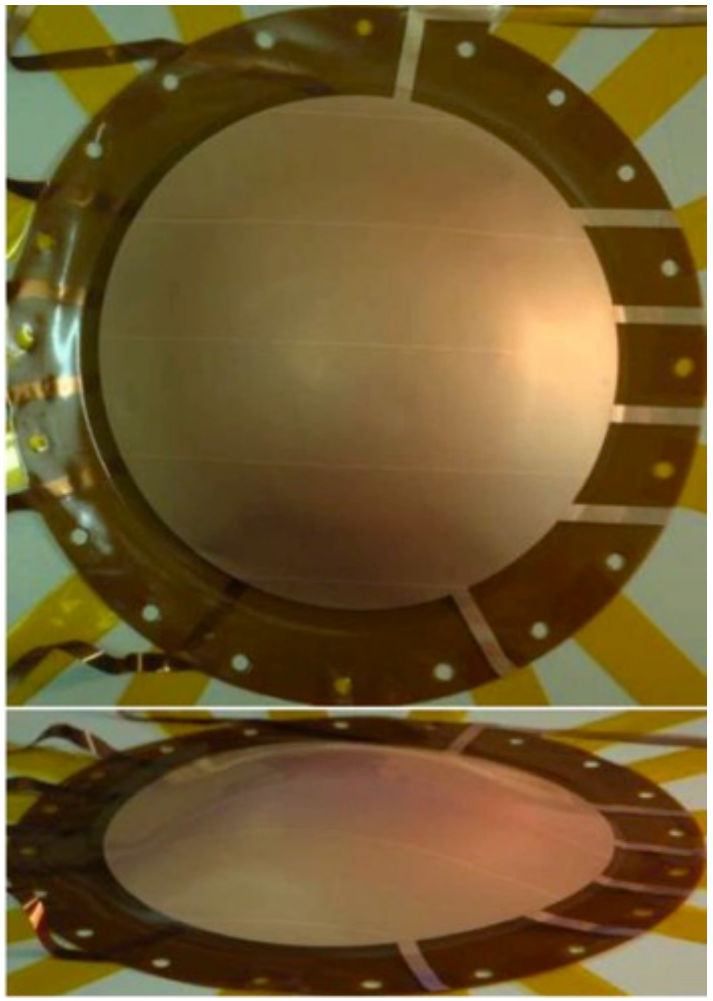
HIGH EFFICIENCY: THICK CONVERSION
SMALL PARALLAX ERROR: THIN CONVERSION

SPHERICAL GEM CHAMBERS

“SPHERICAL” MULTIGEM AND READOUT BOARD (CERN GDD)

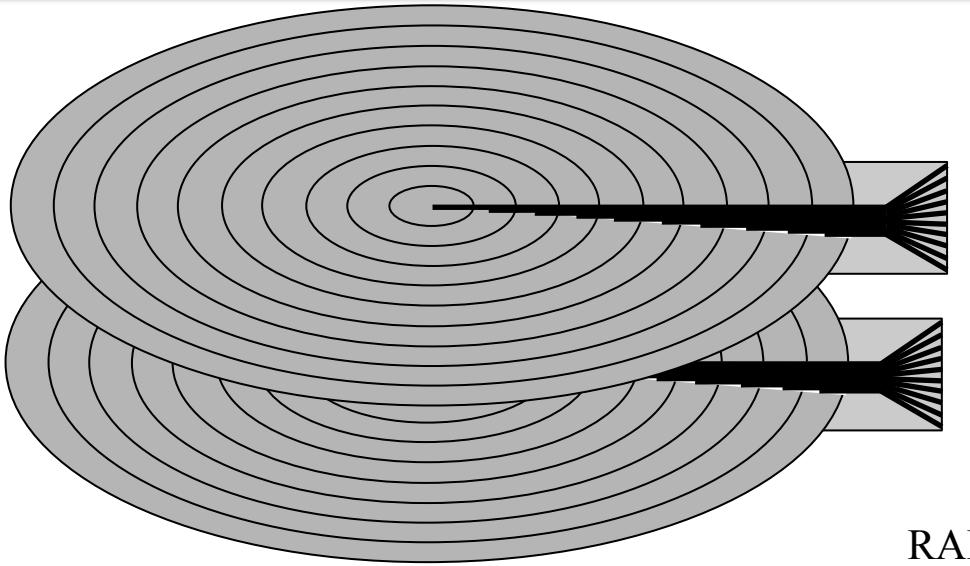






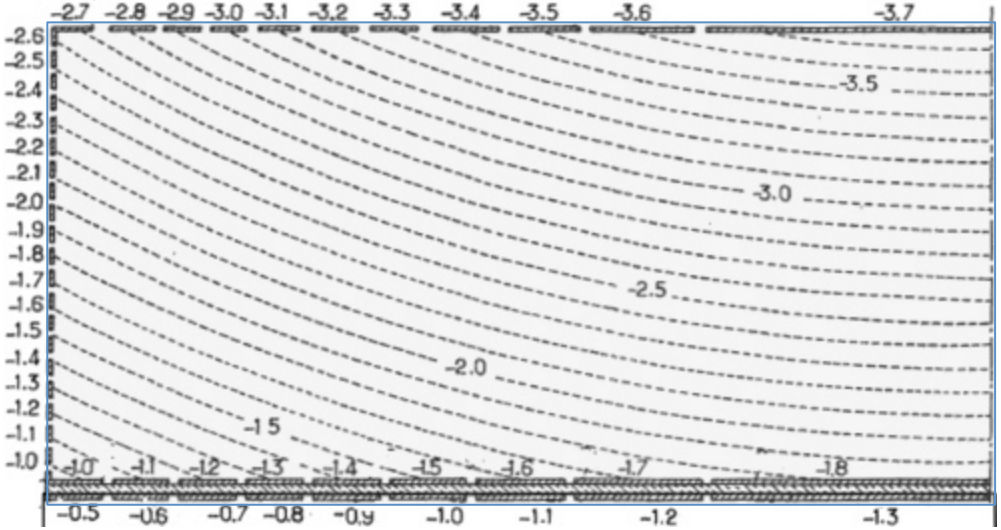
S. Duarte Pinto arXiv:1011.5528v1
IEEE 2011 Nucl. Sci. Symp. Conf. Rec.

PLANISPHERICAL GEM DETECTOR



CONCENTRIC GRADED
POTENTIAL RINGS ON CATHODE
AND GEM ELECTRODES

RADIAL CONVERSION AND DRIFT:



CATHODE

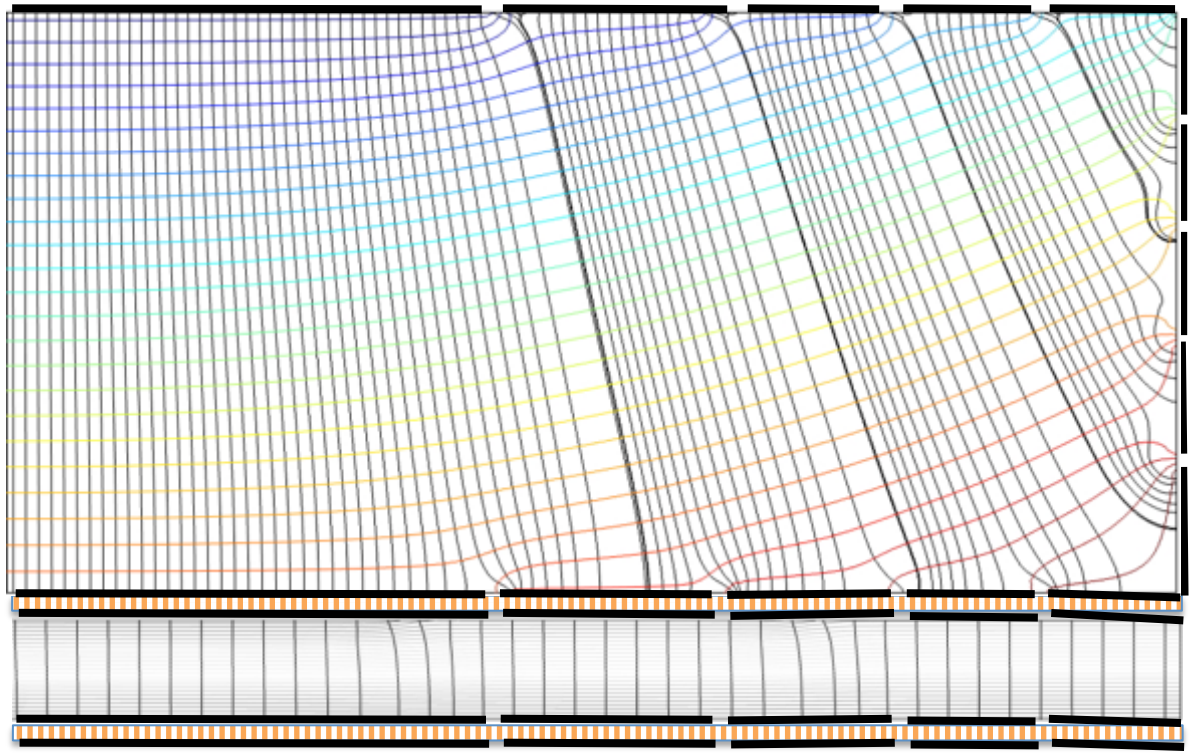
CONVERSION
& DRIFT

GEM

F. Sauli, PCT Patent WO99/21211

PLANISPHERICAL GEM FIELDS

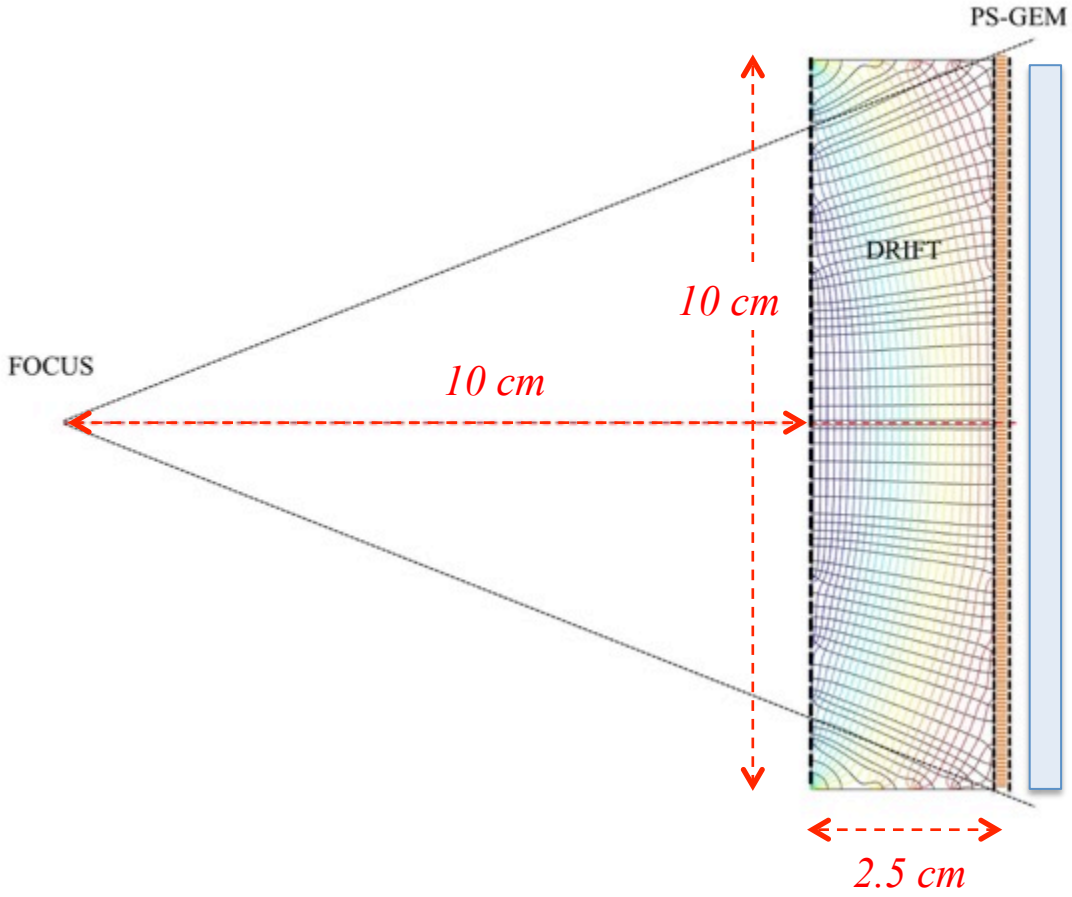
RADIAL CONVERSION FIELD COUPLED TO MULTI-GEM DETECTOR:



Computed with COMSOL Multiphysics

PLANISPHERICAL GEM IMAGER

THICK CONVERSION, PARALLAX-FREE
ADJUSTABLE FOCAL LENGTH WITH EXTERNAL VOLTAGE DISTRIBUTION
ELECTRONICS OR OPTICAL READOUT



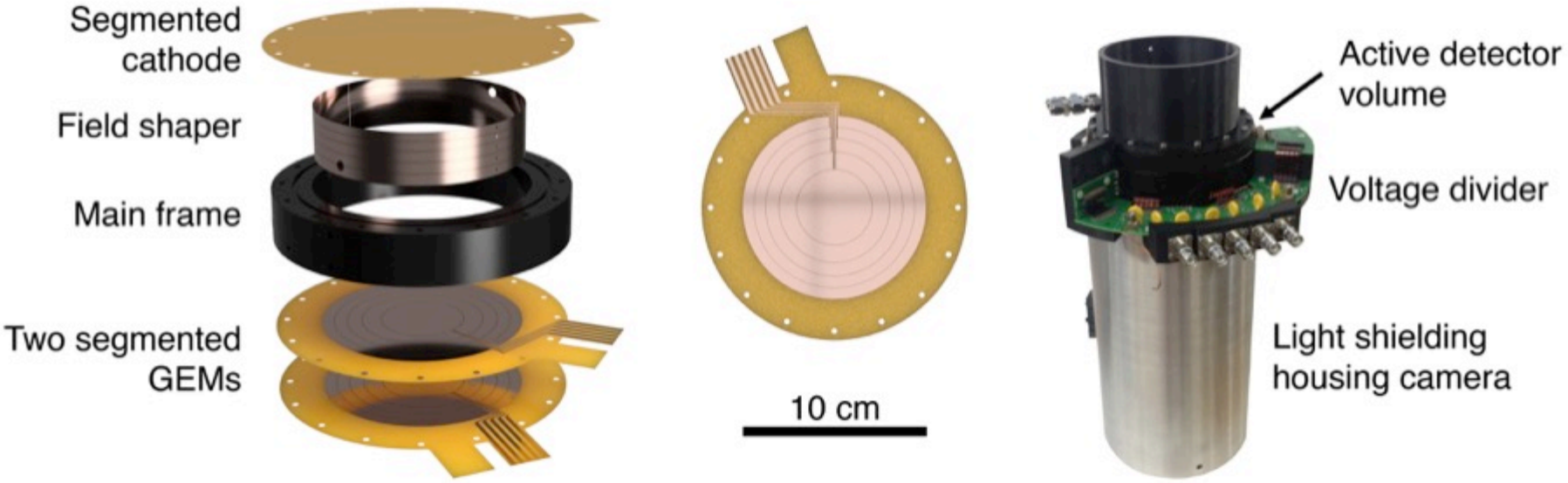
CCD CAMERA

IMAGE RECORDING:
- SINGLE PHOTONS
- INTEGRATED

F. Resnati

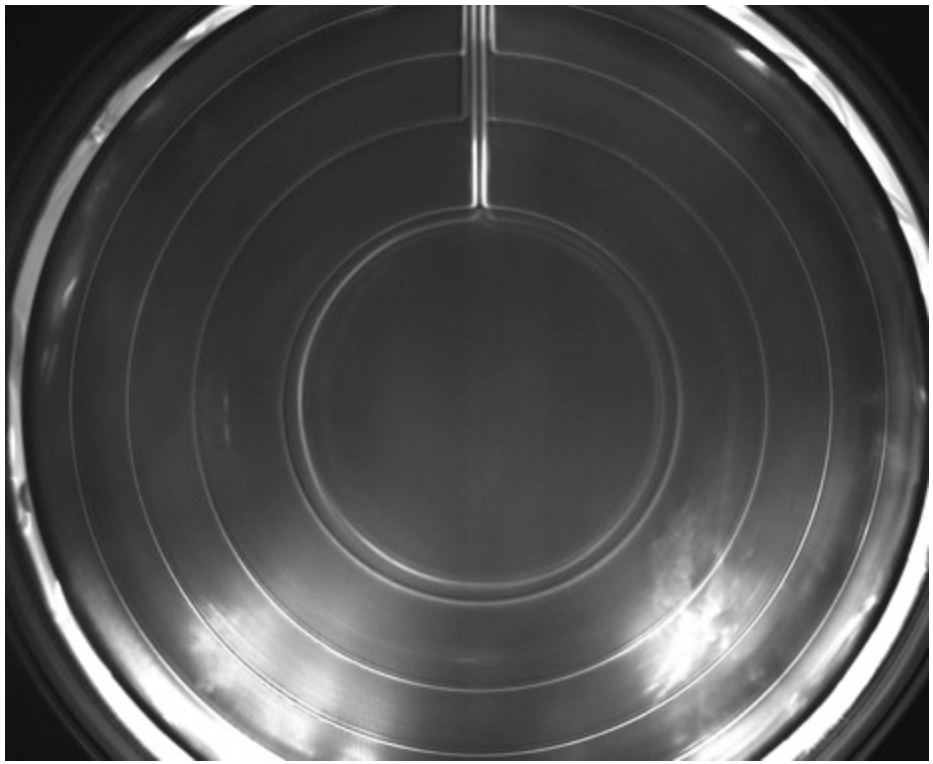
PLANISPHERICAL GEM WITH OPTICAL READOUT

CAD-CAM DESIGN
3-D PRINTING OF MOST PARTS
SEGMENTED GEMS MANUFACTURED AT CERN (R. De Oliveira)

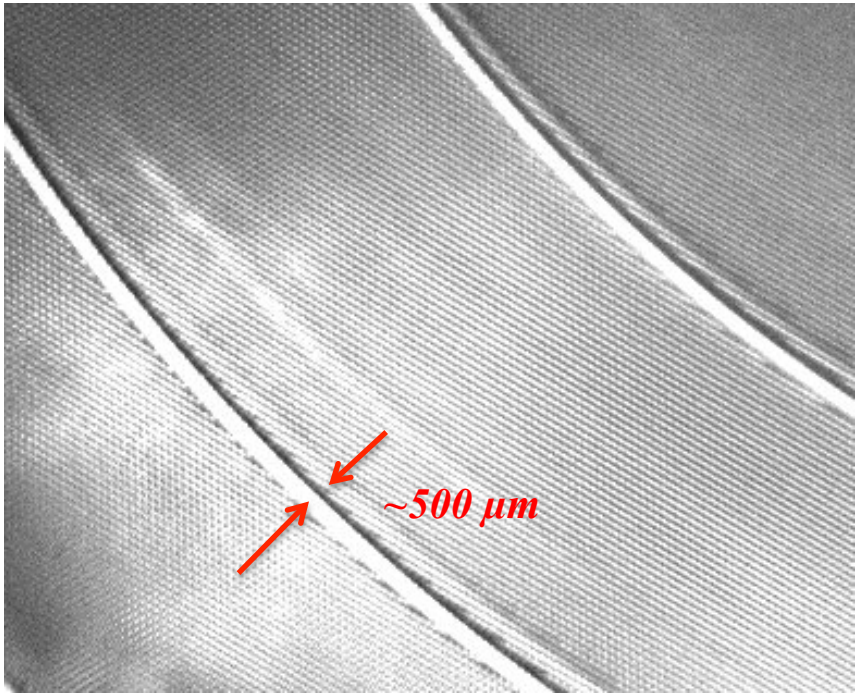


SEGMENTED GEMS

CIRCULAR 5-SEGMENTS FRAMED GEM:



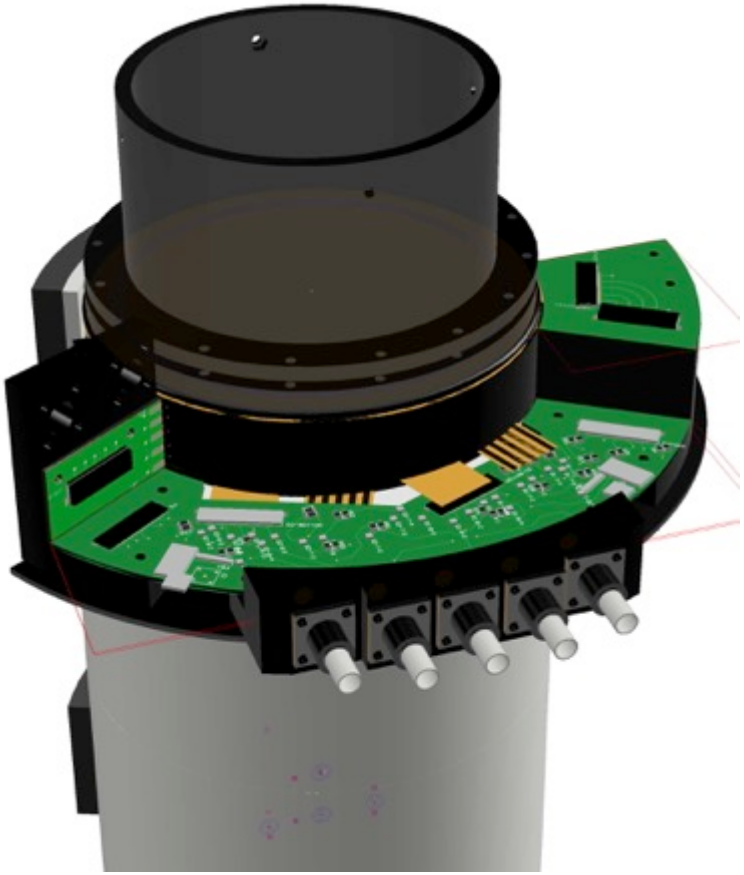
DETAIL OF SECTORS SEPARATIONS:



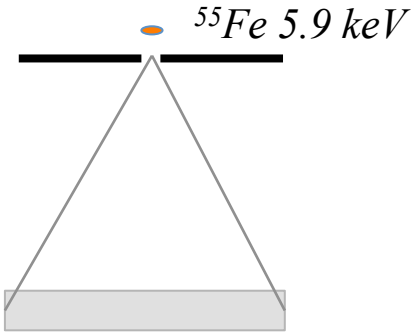
PLANISPHERICAL GEM

ASSEMBLED DETECTOR

DETAIL OF VOLTAGE DISTRIBUTION

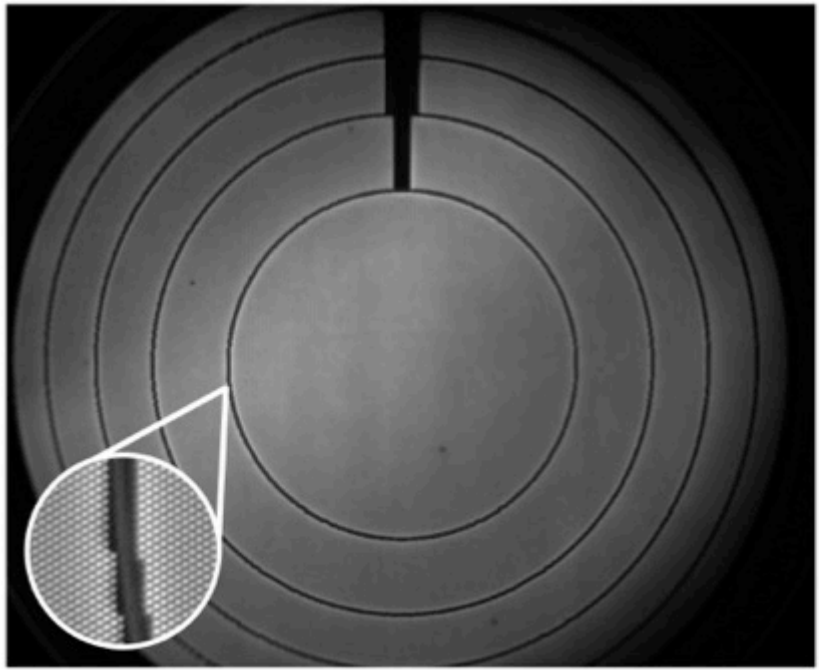


FLOOD EXPOSURE

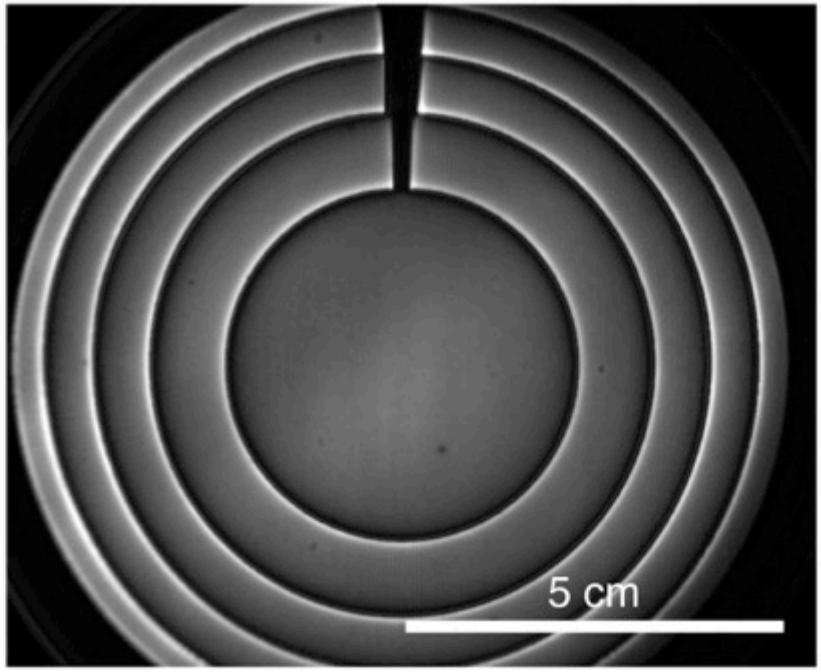


Argon-CF_4 80-20
6 MPixels CCD Camera (4.54x4.54 µm pixels

UNIFORM DRIFT FIELD

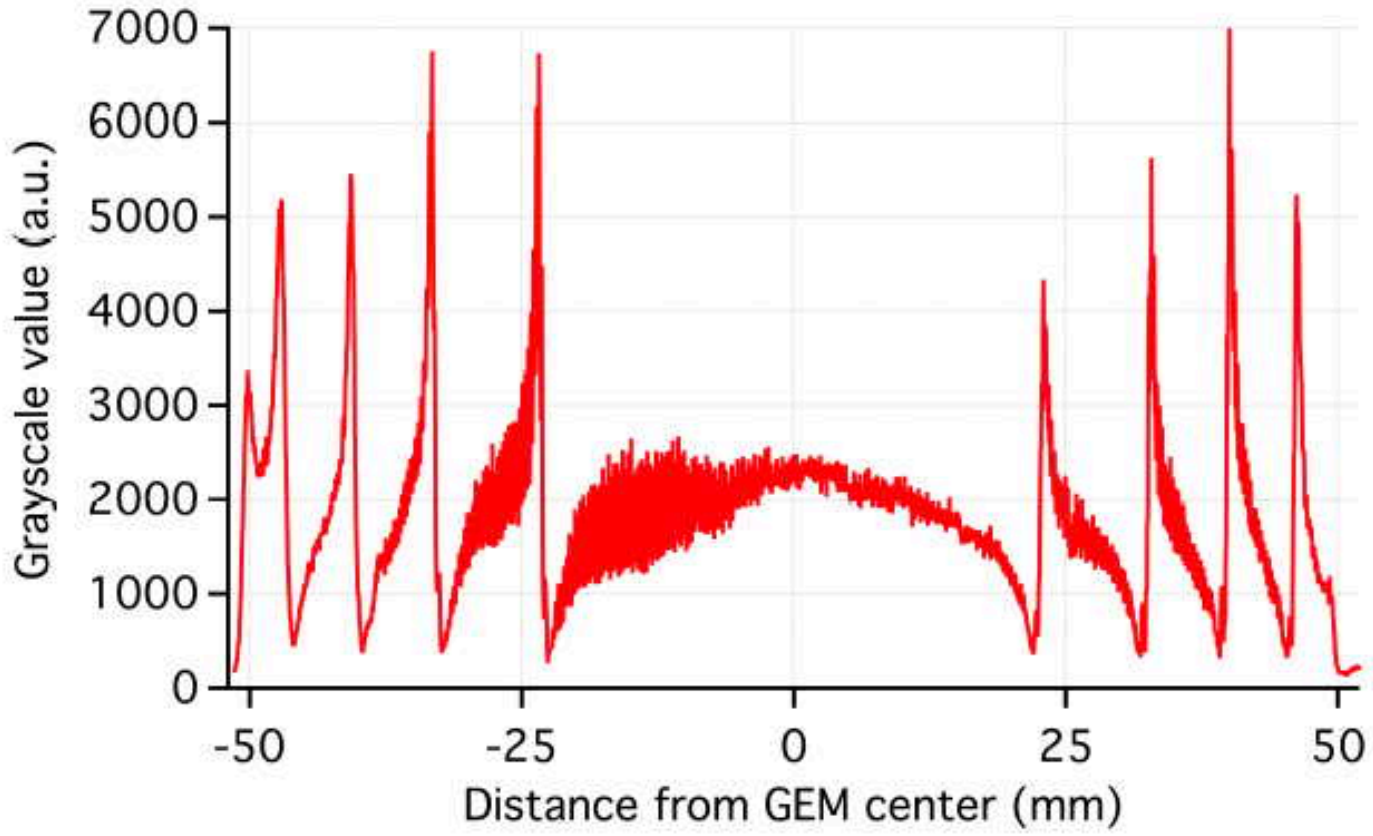


RADIAL DRIFT FIELD



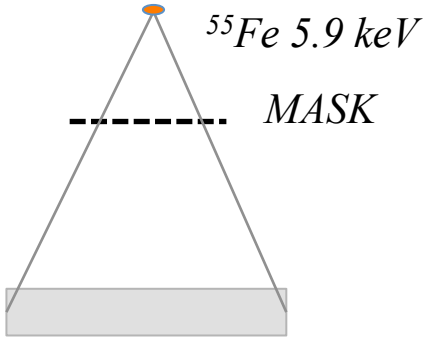
DISTORSIONS AT SECTOR EDGES

- NO EFFICIENCY LOSS
- CAN BE CORRECTED BY SOFTWARE

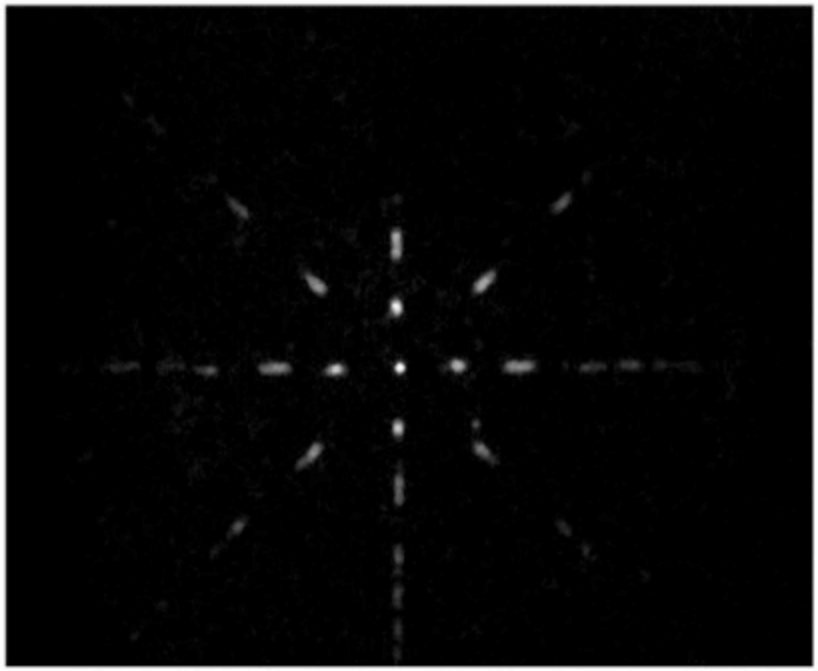


HOLES PATTERN

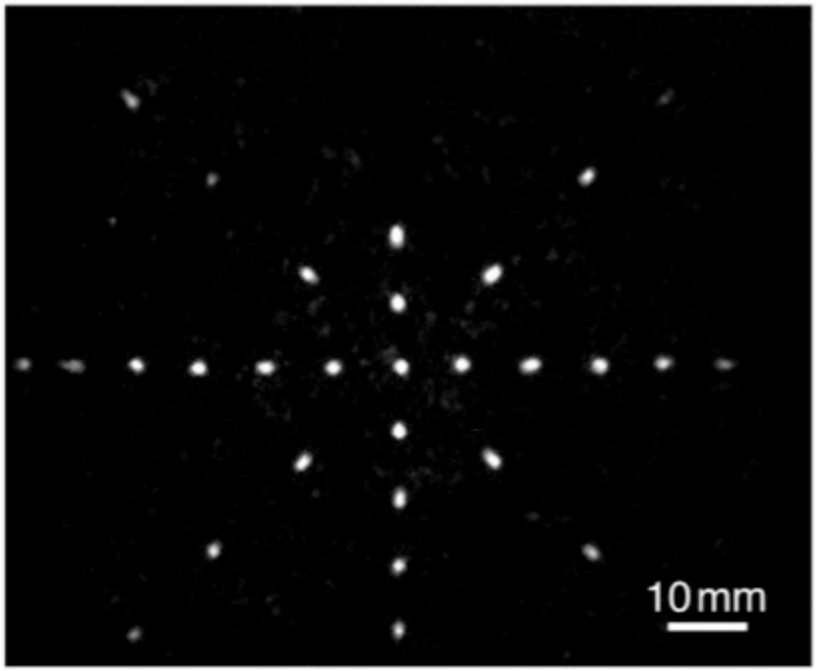
MASK WITH 1 mm Ø HOLES PATTERN



UNIFORM DRIFT FIELD

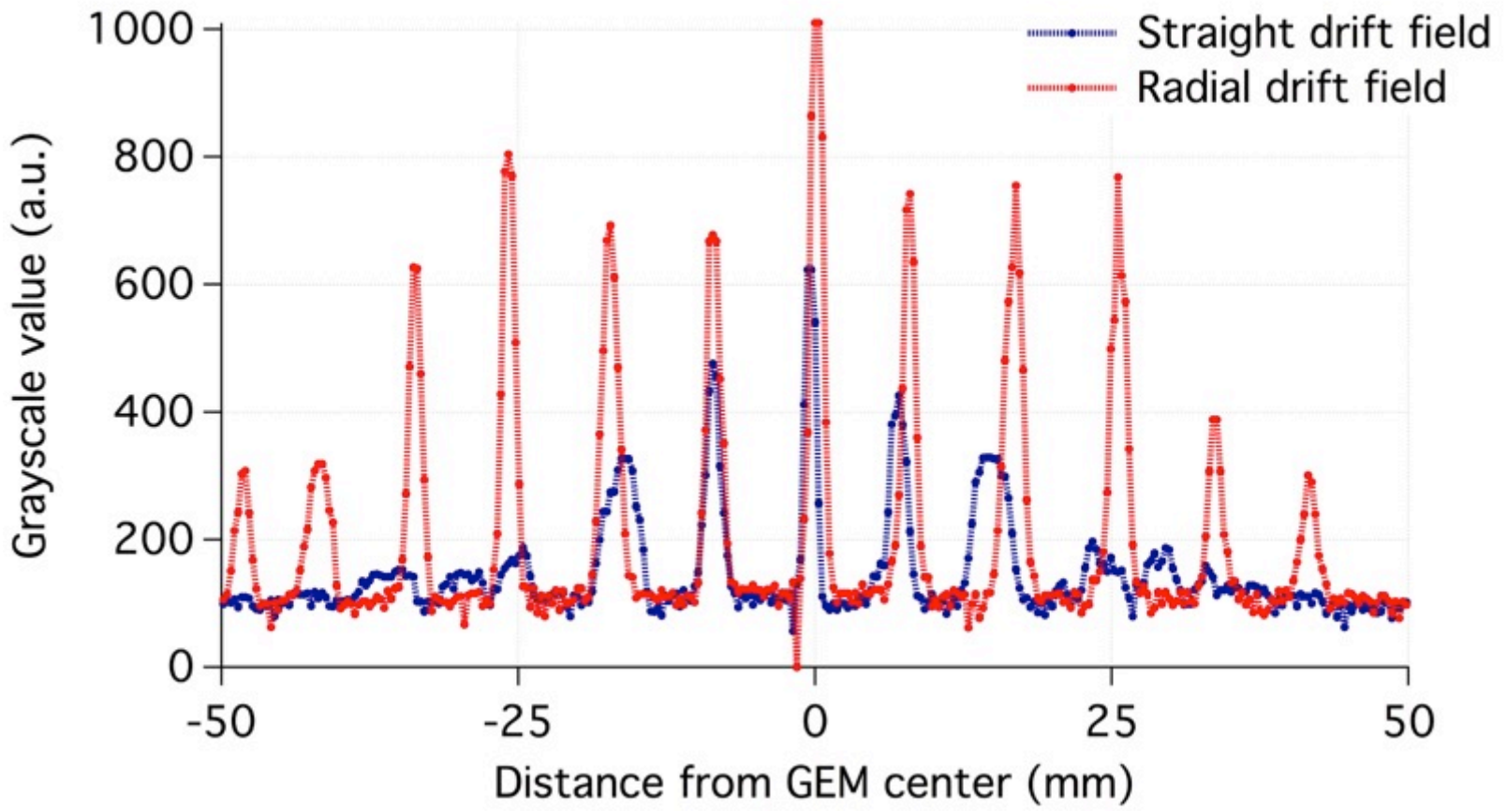


RADIAL DRIFT FIELD



HOLES PATTERN

INTEGRATED LIGHT INTENSITY THROUGH A ROW OF HOLES:




That's all Folks!