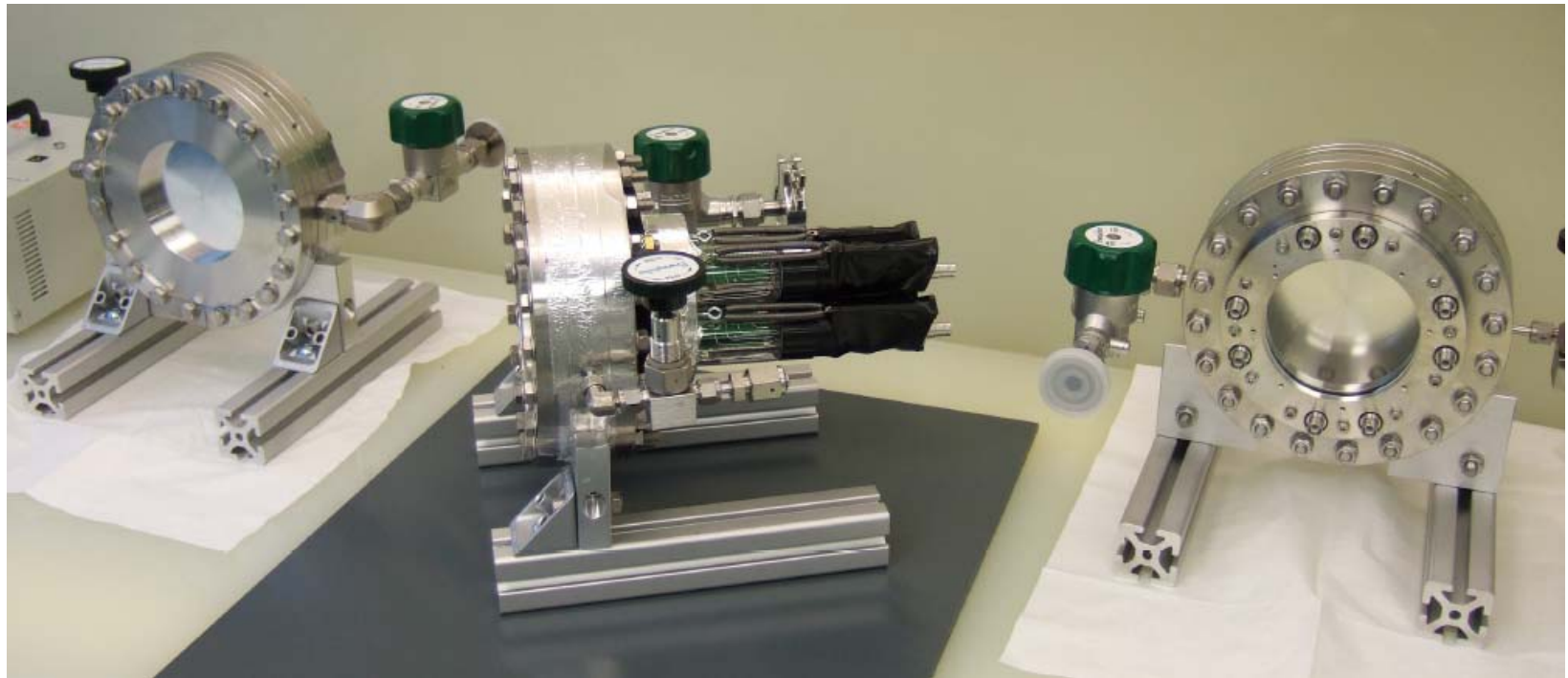


A small prototype for light readout studies

A status report and first results

I. Defendi, A. Siebert, S. Winkler, K. Zeitelhack; FRM II, *TUM
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■ WP 22.3 : Readout Device Investigation

Explore the potential of different PMTs

Single cathode PMTs

Window type i.e. quartz, blue and red

Cathode area

Packing arrangement

PS PMTs

Round, Square

MA PMTs

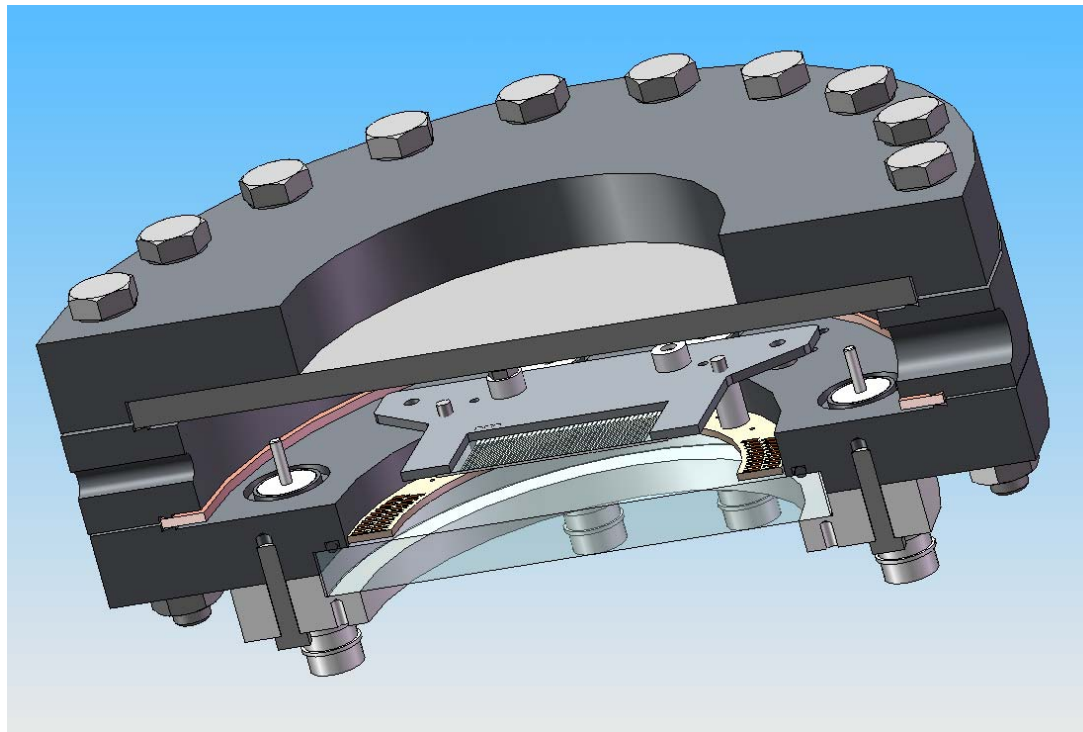
16, 64, 64 flat panel, 256 flat panel



→ Build for each partner an identical small prototype

This allows a distribution of tasks and a comparison of results

Prototype design



PMT-mounting
easy change without effect on device

LIPC/ILL design based on
CF150 flange adapted by
Ilario Defendi

3 devices built at FRM II

Entrance window:

6mm Al 6082;
98mm aperture

Exit window:

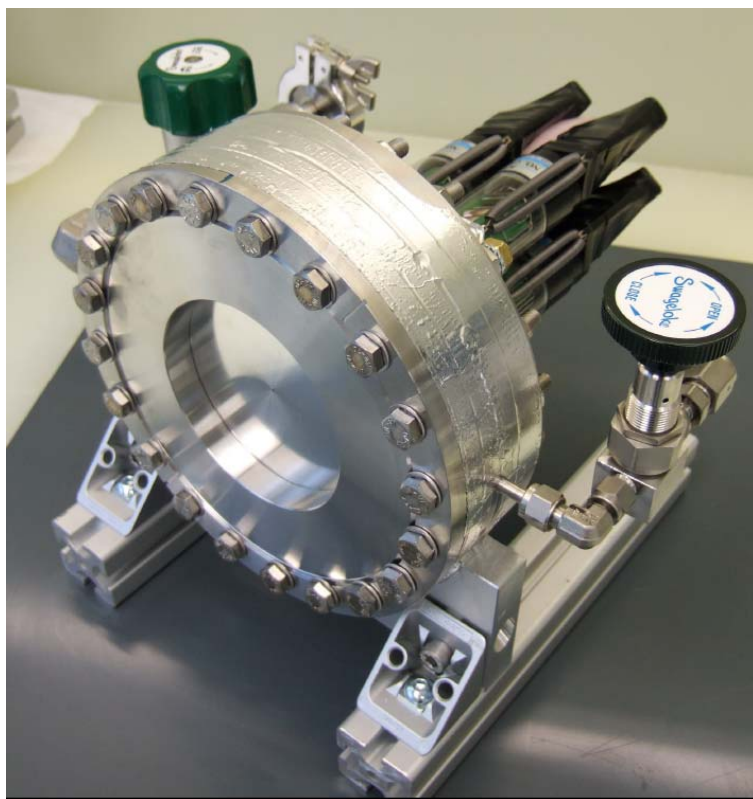
11mm Suprasil 2B
aperture 96mm
 $p = 4$ bar at full aperture

MSGC:

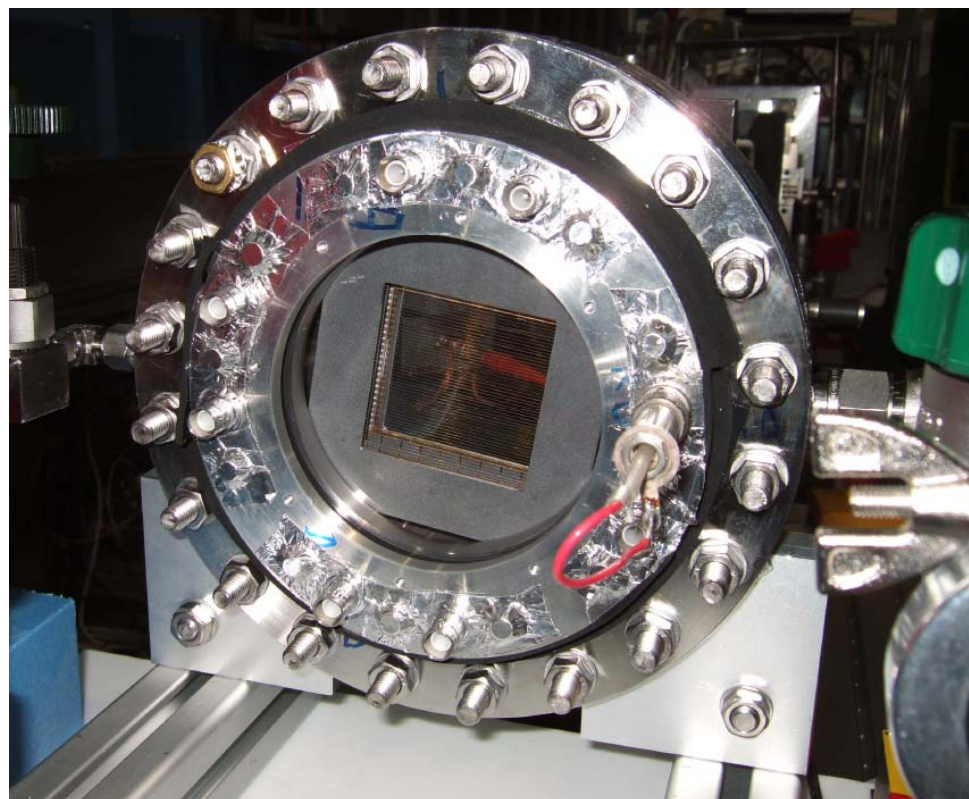
ILL6C design
summed anode / cathode

Prototype for light readout studies

Front view

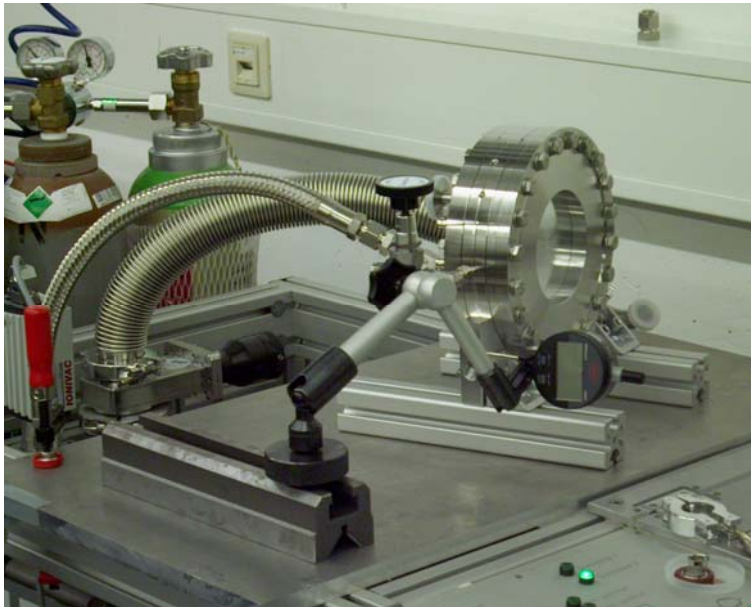


Rear View



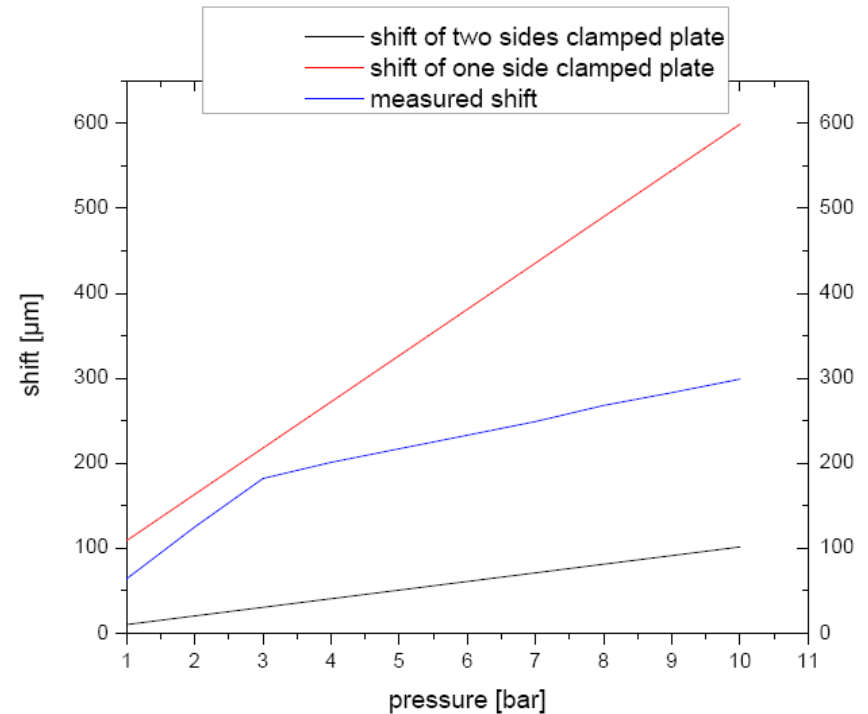
Leak and pressure test

Device on gas filling station for He-leak and pressure test



Max. fill pressure $p=10$ bar
Measure strain on front window

Measured strain of 6 mm Al-6082 front window



Safety factor 1.5 at $p=10$ bar

Quartz window

Heraeus SUPRASIL 2 grade B

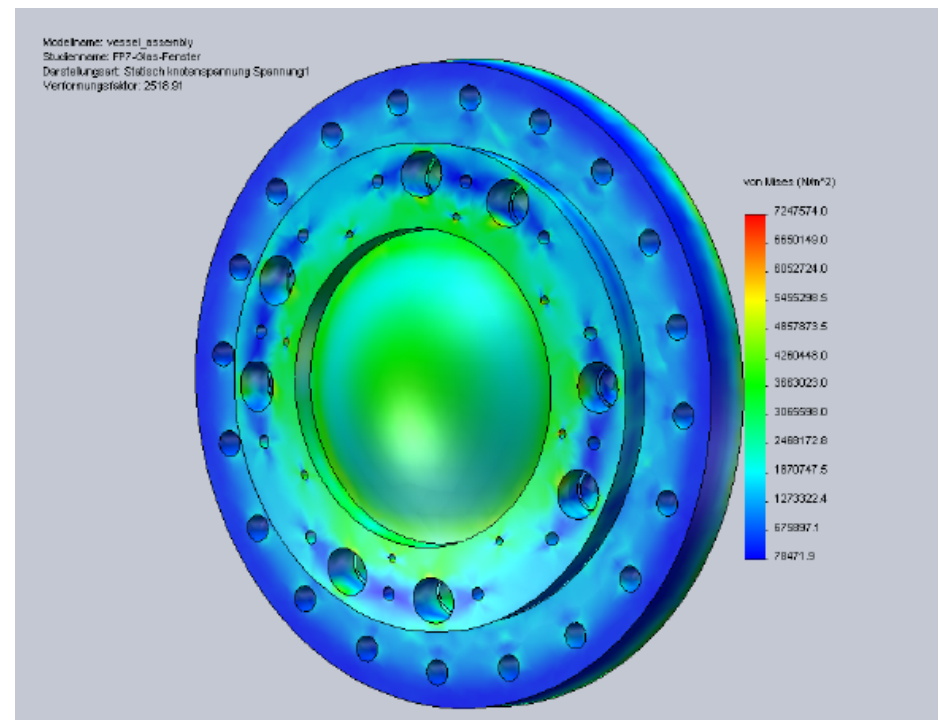
Thickness: 11 mm

Aperture: 98 mm

Certified to 3.6 bar pressure diff.

- transparent > 170nm
- bulk transmission > 98%
- No fluorescence
- Low internal stress
- 430,- € per window
- Max. permanent stress permitted: ~ 4 N/mm²

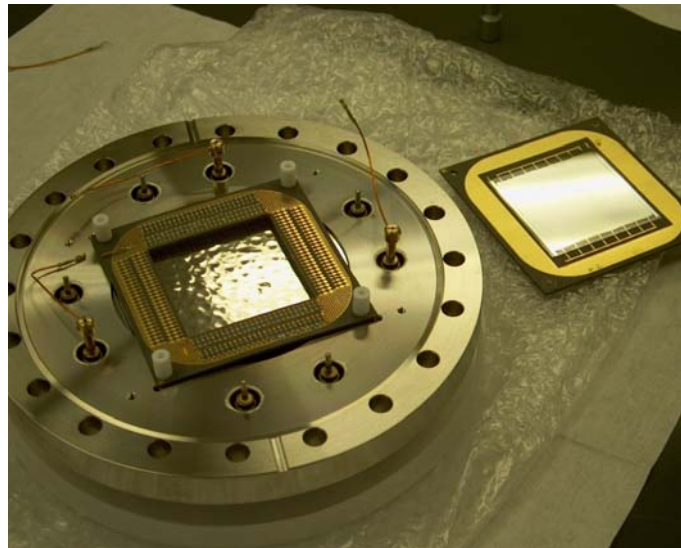
Fill pressure: 4 bar
Max stress: 4.5 N/mm²



■ All devices passed leak and pressure test !

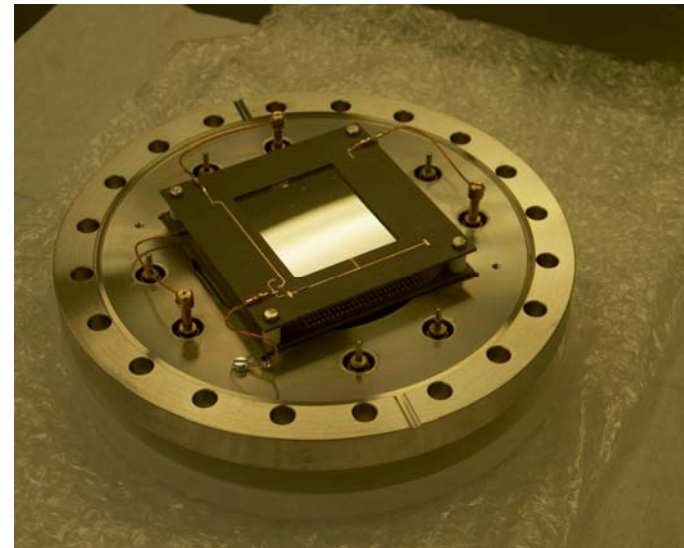
“training device” with homemade MSGC (MucPad)

Back flange with drift grid



50 μ m Au plated W-wire
1mm pitch

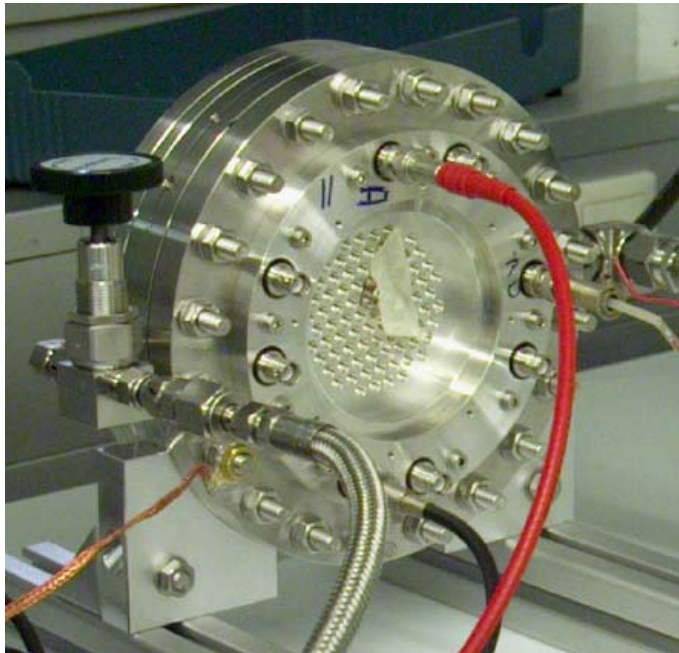
MSGC & drift grid mounted



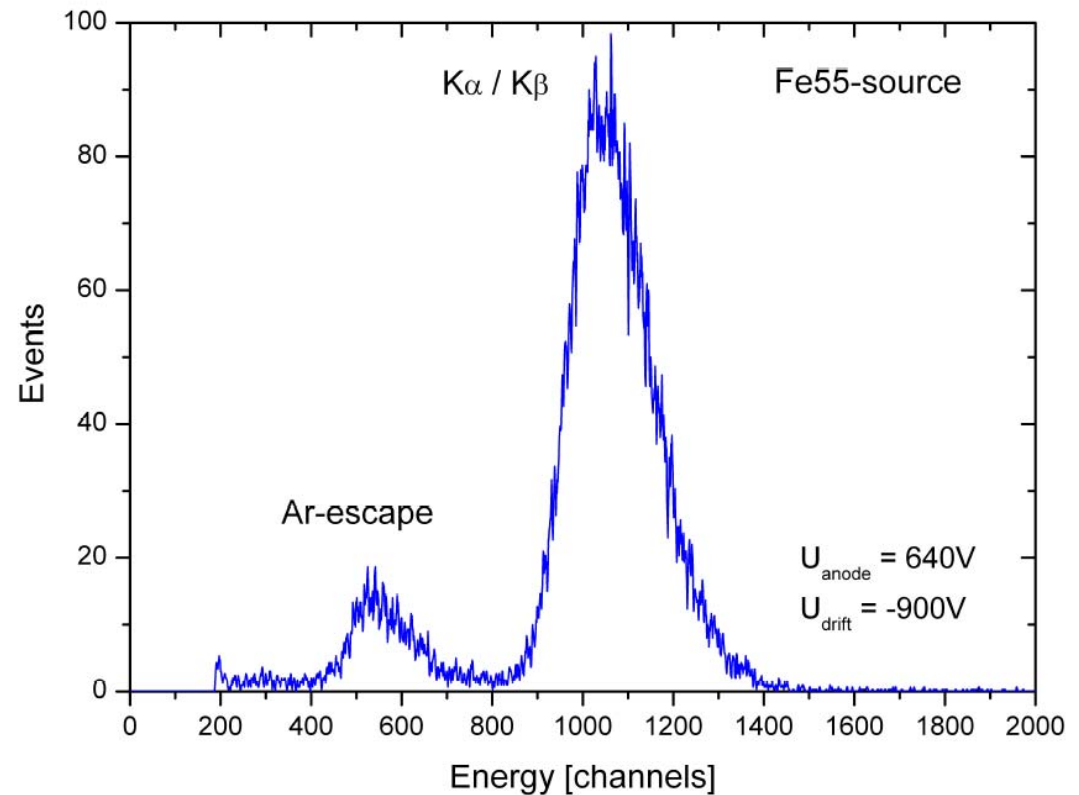
Al-strips on D263 glass
Active area 53 x 43 mm²
Anode: 10 μ m
Cathode: 350 μ m
Pitch: 660 μ m

MSGC quality test with ^{55}Fe source

Quartz replaced by Mylar window
 Detector gas: Ar-CH₄ 90/10
 $p = 1\text{atm}$

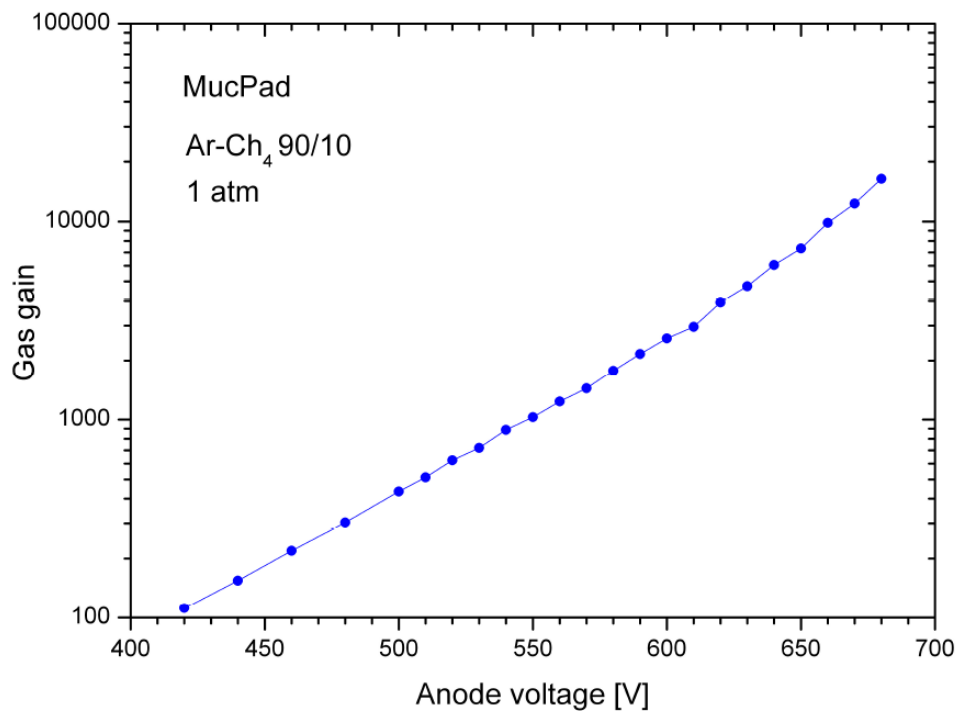


^{55}Fe Energy spectrum

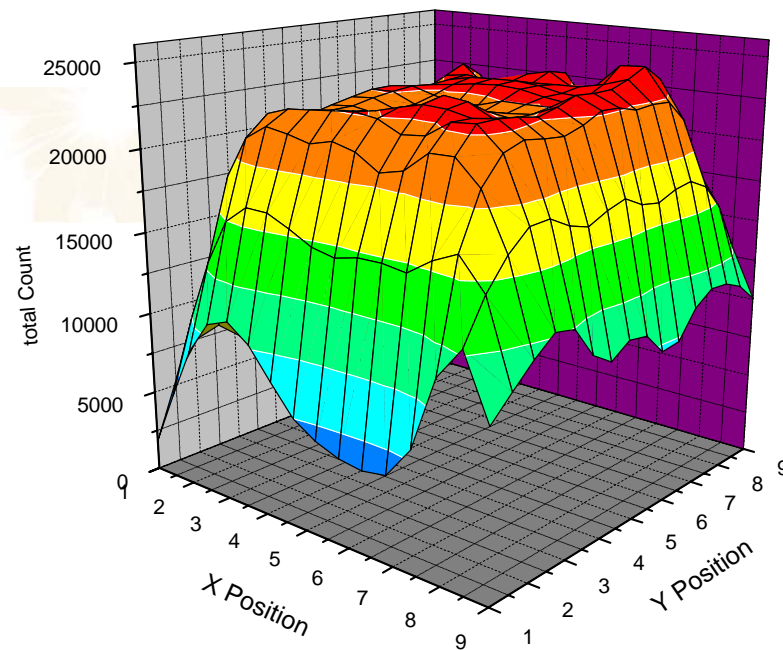


MSGC quality test with ^{55}Fe source

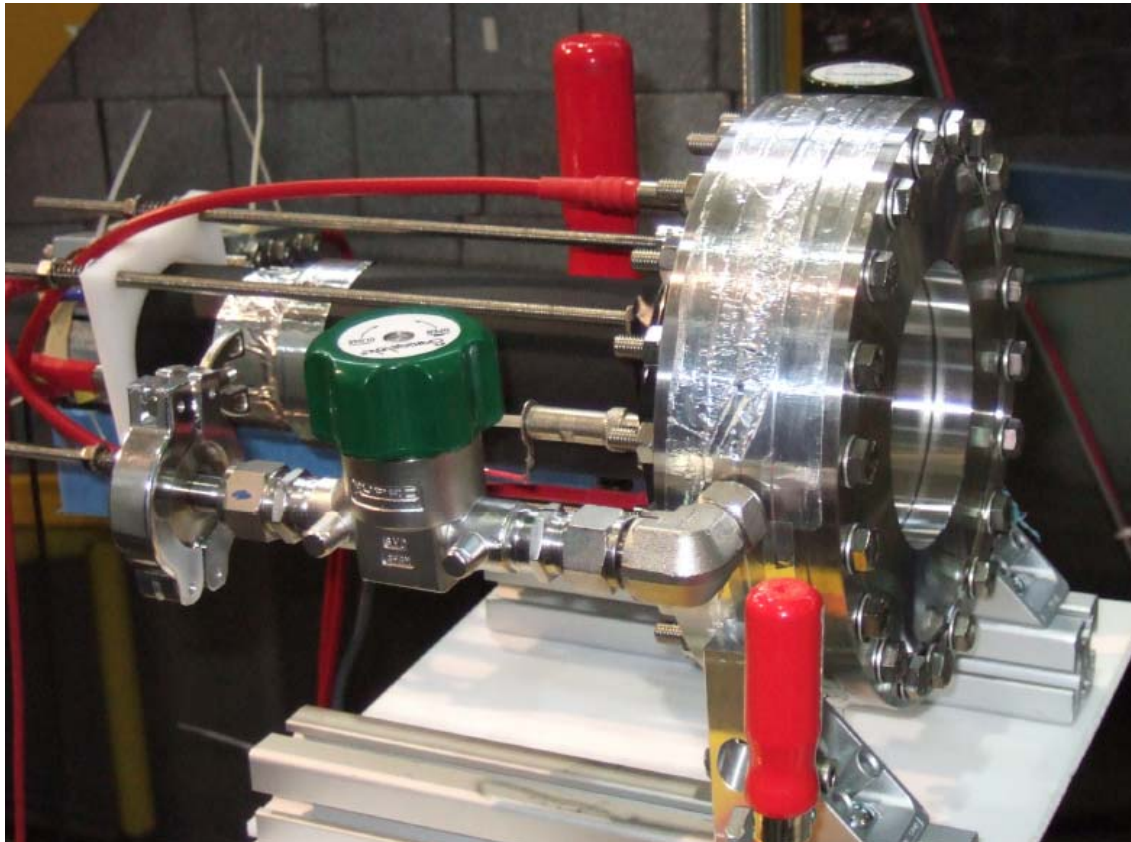
MSGC gain



Spatial homogeneity of efficiency



First test at FRM neutron test beam station TREFF



MSGC: MucPad

1bar CF_4 + 0.3bar ^3He

Gain ~ 200

drift gap = 10mm

Light Readout

Single 2" PMT

Hamamatsu H1949-50

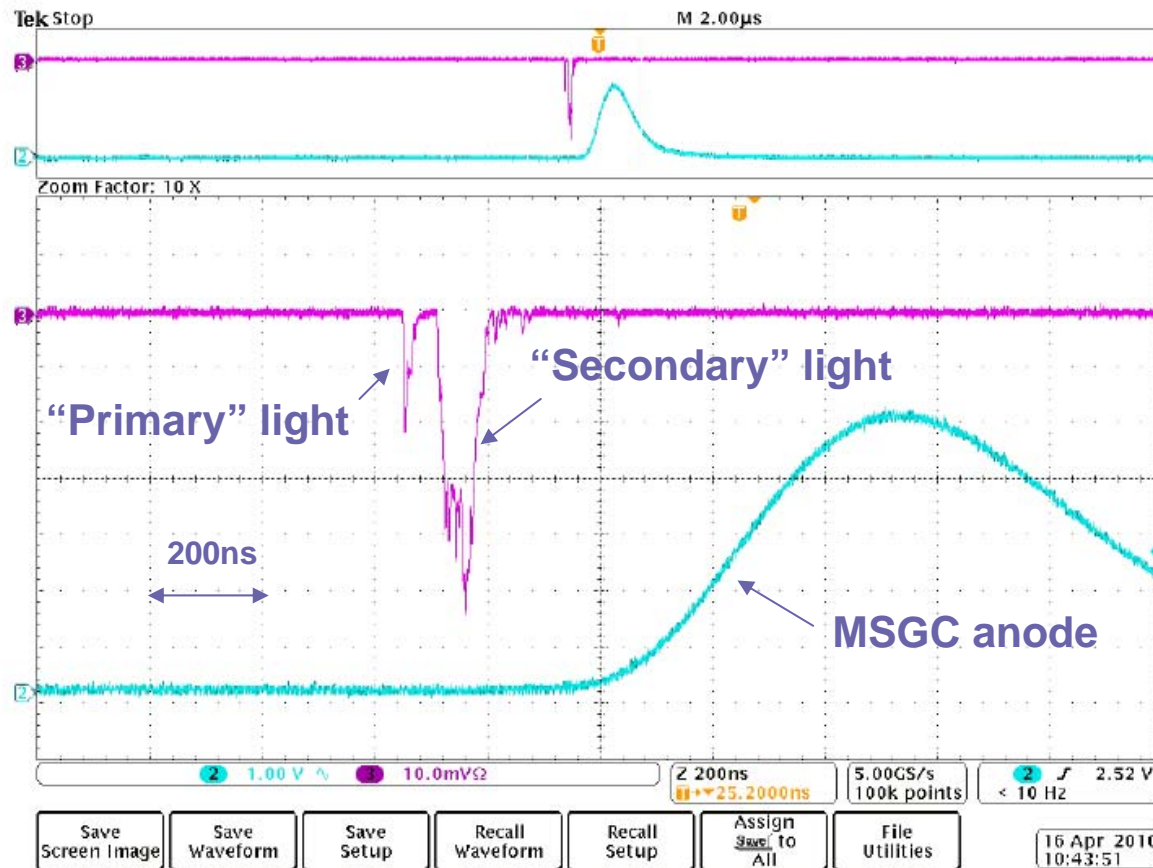
Bialkali photocathode

Borosilicate glass

Distance MSGC-PMT

d ~ 28mm

First signals recorded with neutrons



To Do...

- All missing parts in house
- Mount ILL6C and new drift grid
- Study device with ^{55}Fe -source
- Send device to STFC for He-filling (end of June 2010)
- Finish ^3He recycling station (~ June 2010)
- Fill device for FRM II and FZJ (~July 2010)