



AIDA²⁰²⁰

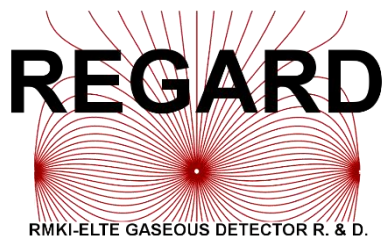
2nd Annual Meeting

Task 13.4.4

"Leopard" system progress

Gábor NYITRAI

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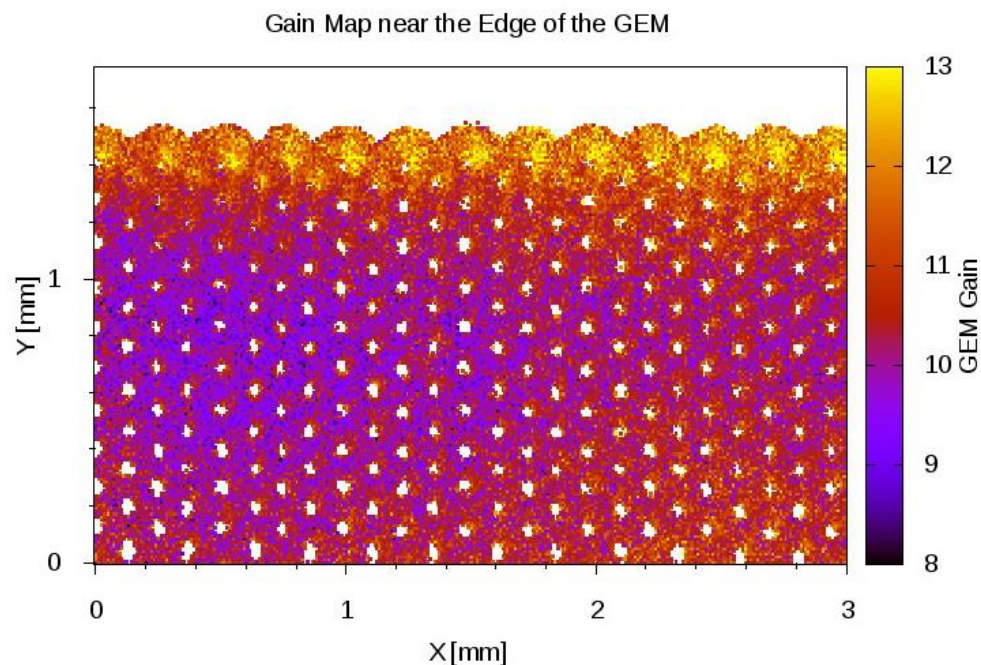
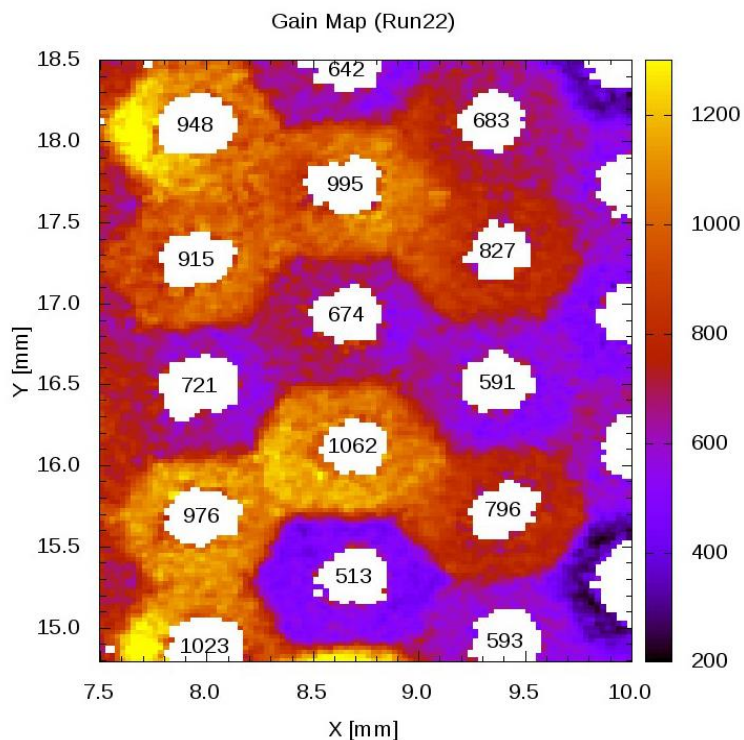


What is "Leopard"

High resolution MPGD hole-by-hole gain map scanner

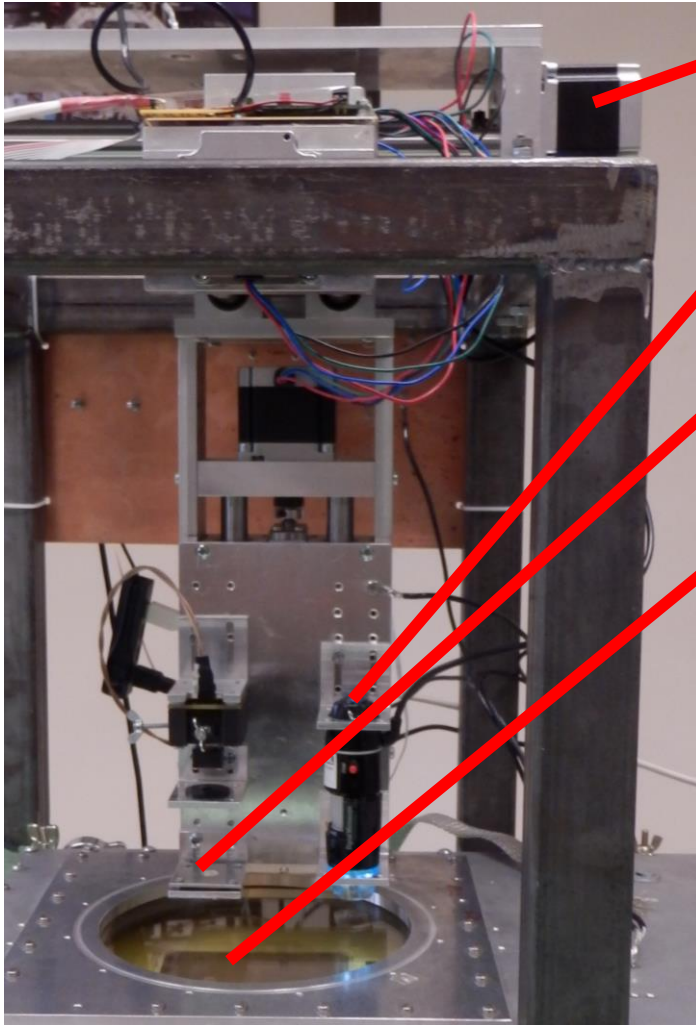
TGEM gain map (2010)

GEM gain map (2014)



G. Hamar, D. Varga NIM A 694, p 16-23 (2012.12.)

How Leopard works



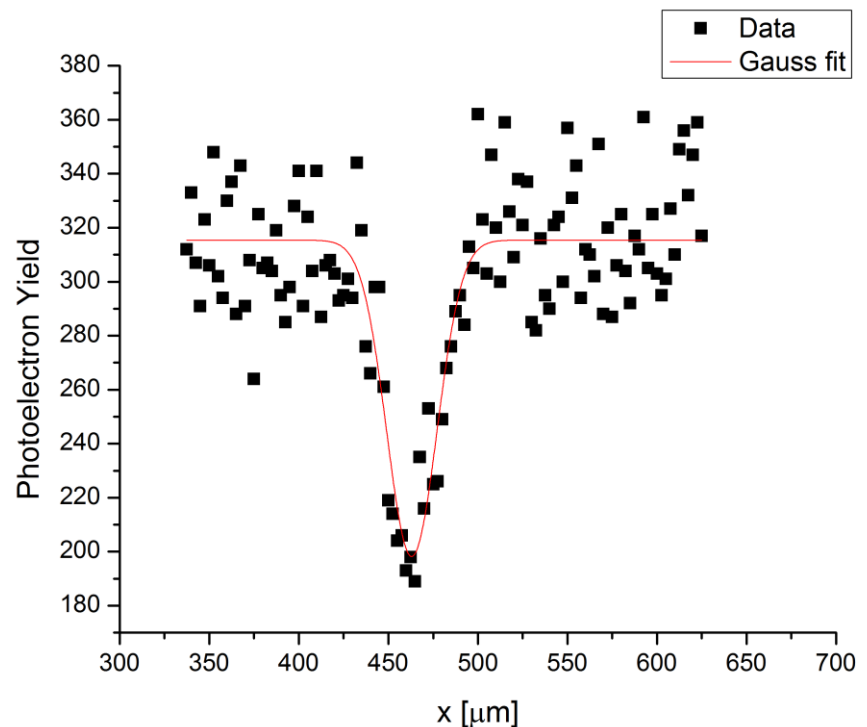
- 20x20 cm² x-y scan area with 2.5 μm res. step motors,
- USB Microscope Camera (MC),
- Optical system with UV source, pinhole, lens,
- Gaseous detector with fused silica window, cathode wires, GEM under study and below the signal reader part,
- DAQ system with Rpi.

AIDA-2020 work plan

- Month 12 milestone was:
 - Small size prototype of optical/gain scanning,
 - Establishing correlation,
 - Understanding key features towards industrial version,
 - Initiation of a longer term R&D in parallel with large version construction.
- Month 44 deliverable:
 - Large size demonstrator for MPGD hole-by-hole gain map for QA purposes.

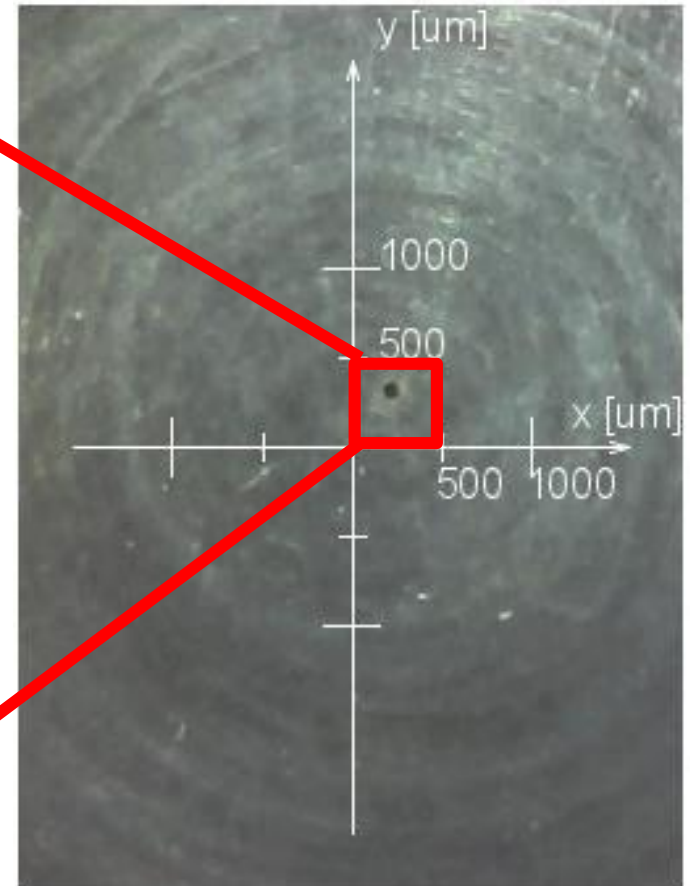
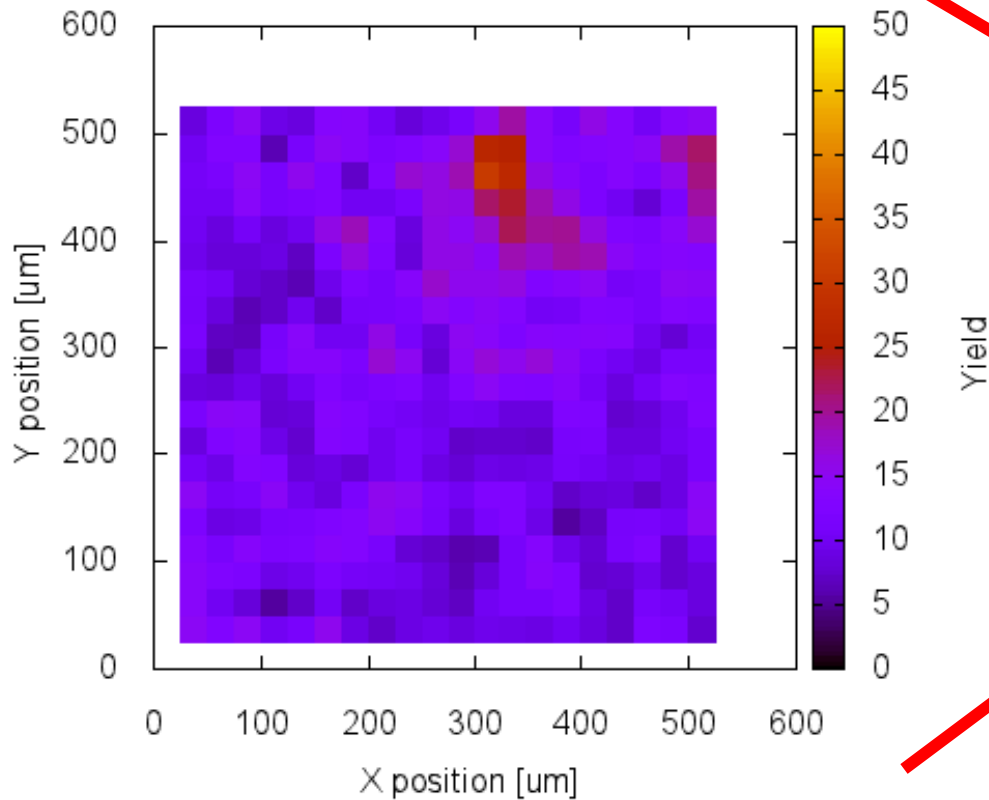
Position resolution

- After considerable upgrade (see backup slides)
- Using a 30 μm pinhole,
- Focusing the light on 25 μm wires,
- FWHM of **32 μm** .
(earlier it was 60 μm)



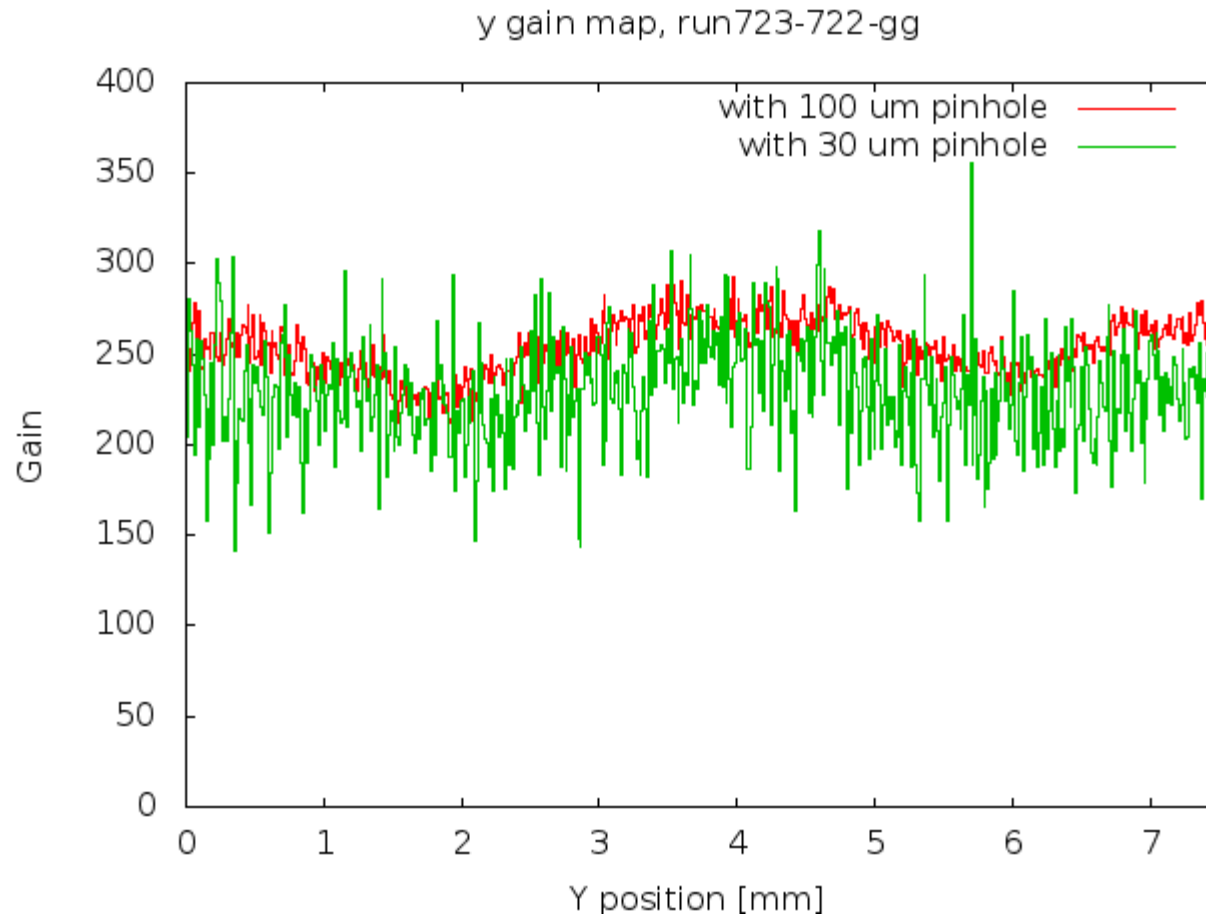
Position stability

Yield map – MC photo correlation



Gain reproductivity

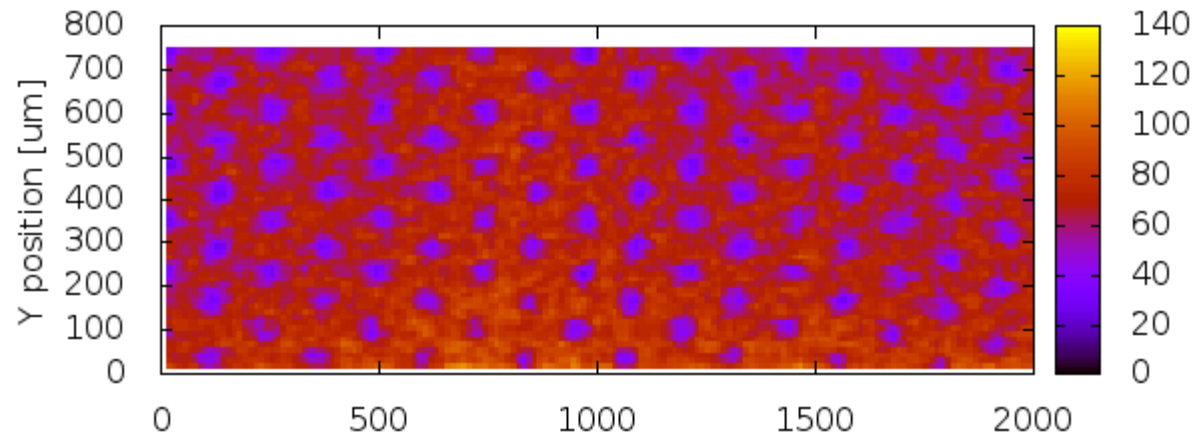
Well reproducible gain over the same area



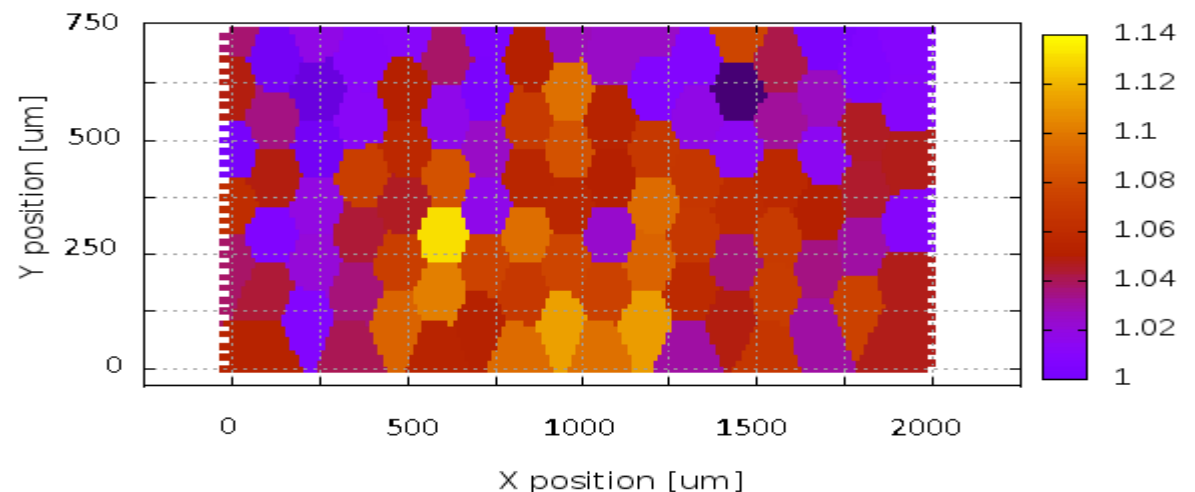
Au GEM scan

- Gold plated normal GEM (140 μm pitch, 60 μm dia. holes, 70 μm thickness)
- Scan time approx. 100 min.

Yield map:

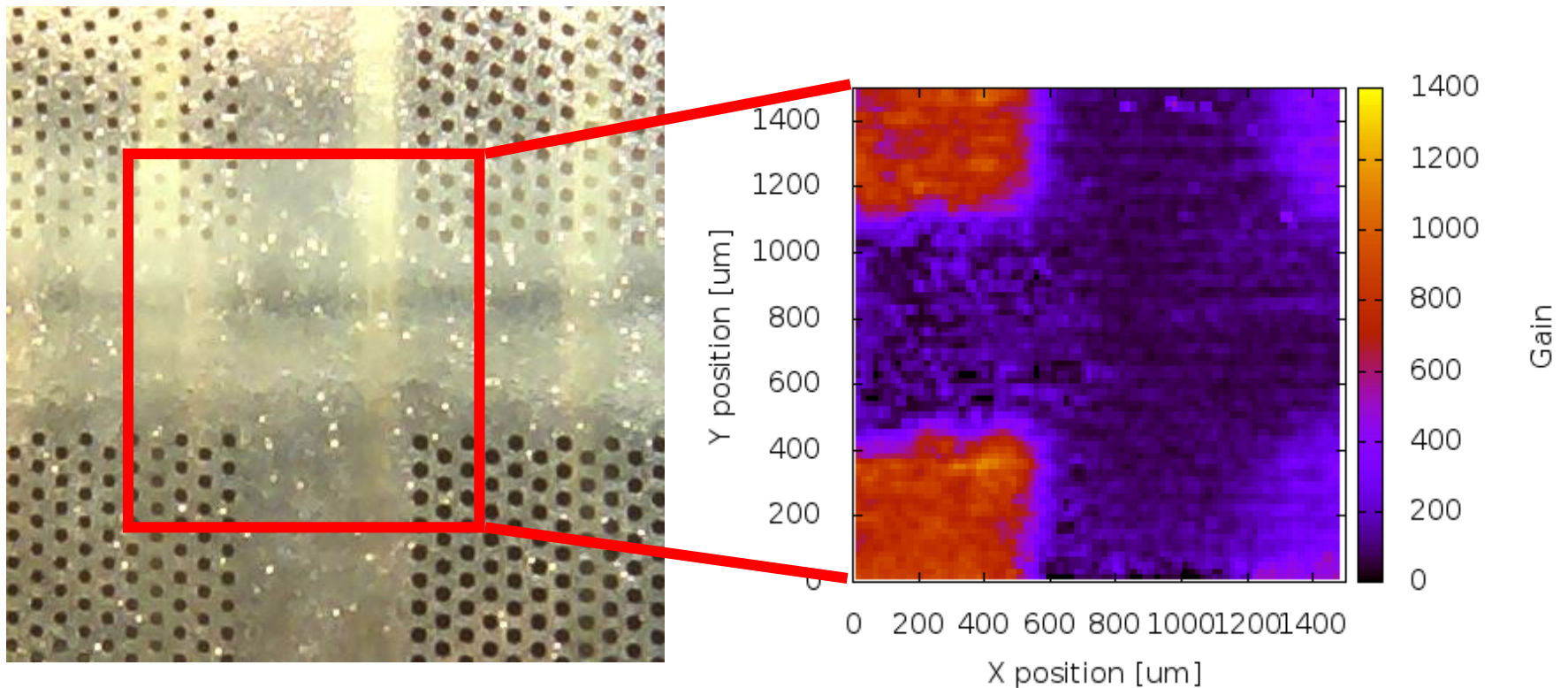


Gain map:



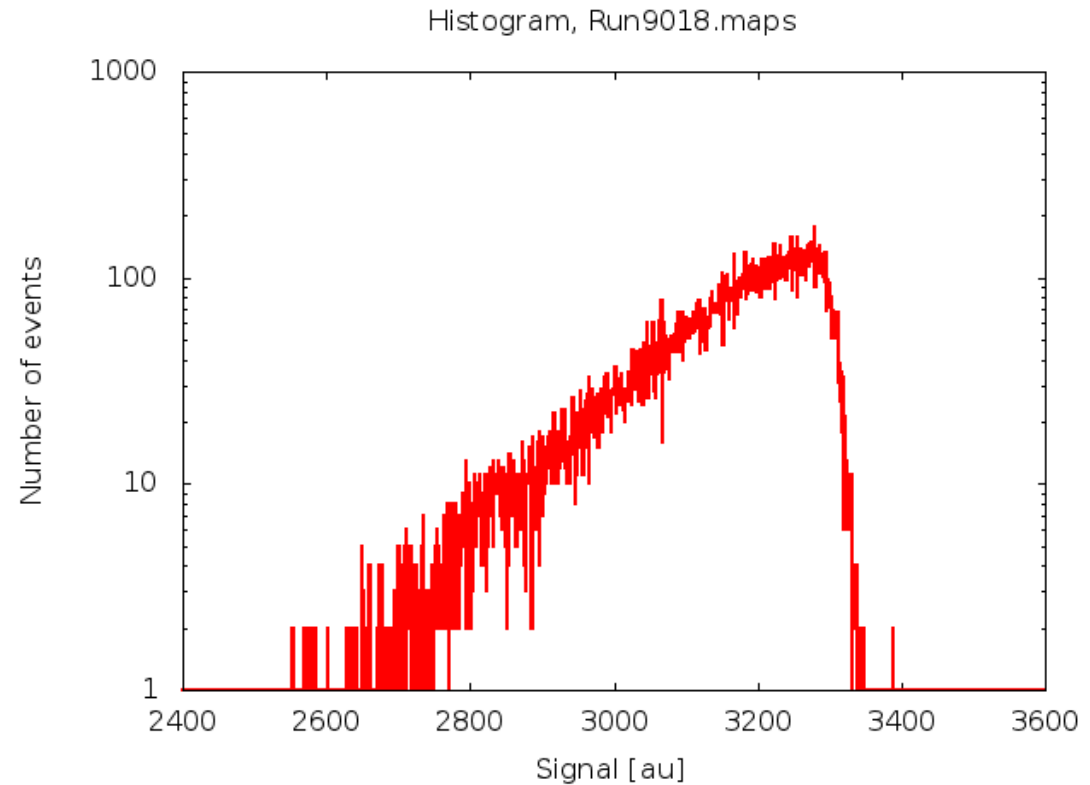
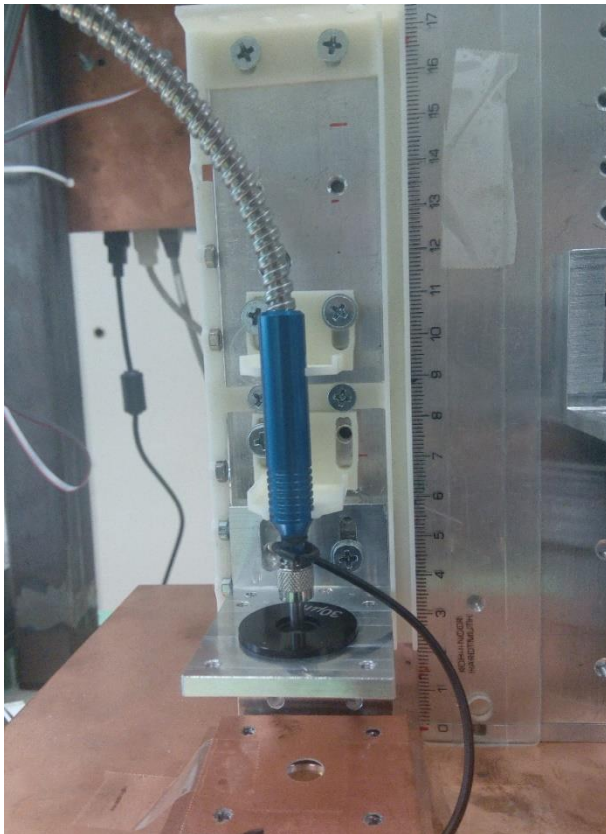
Cu GEM scan

- Copper plated normal GEM (140 μm pitch, variable dia. holes, 70 μm thick.)
- Scan time approx. 10 h



Deuterium lamp

- 30W Newport 68942 Deuterium lamp under study,
- Self-trigger operation implemented.



Plans for the future

- Measuring 2D scans with deuterium lamp, expecting reduced scan time,
- Compare the deuterium scans and pulse LED scans and decide which one is better,
- Ease and speed up calibration with hardware upgrades,
- Develop control GUI,
- Approaching the key motivation: **measure the effect of typical GEM faults.**

Summary

- Leopard system is a prototype for GEM QA:
 - Accessible area (20 x 20 cm²)
 - Mounted USB microscope, fast visual check
 - Robust optical system structure
- Position resolution of 32 μm
- We are able to measure standard GEMs hole-by-hole

Thank you for your
attention!

Backup slides

Upgrades

- New aspheric UV len with 25 mm focal length
- Optimised optical setup (blende size, object-image distance)

Funding

Approximately following the flat rate budget plan:

- 50% from EU funding (mostly personnel)
- 30% from the Hungarian Academy of Sciences, matching (mostly equipment)
- 20% from Wigner: consumables, lab space refurbishing, workshop support