

EMC Backward Endcap Status report

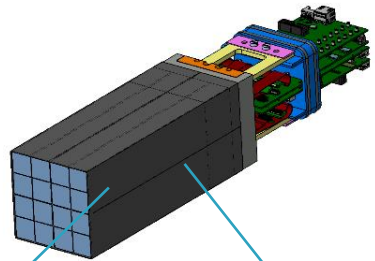
L.Capozza , R. Gowdru , S. Katilmis , D. Liu, F. Maas
J. Moik , O. Noll , D. Rodríguez, C. Rosner, P. Schöner , S. Wolff

Panda Collaboration Meeting, EMC session
12. 10. 2022

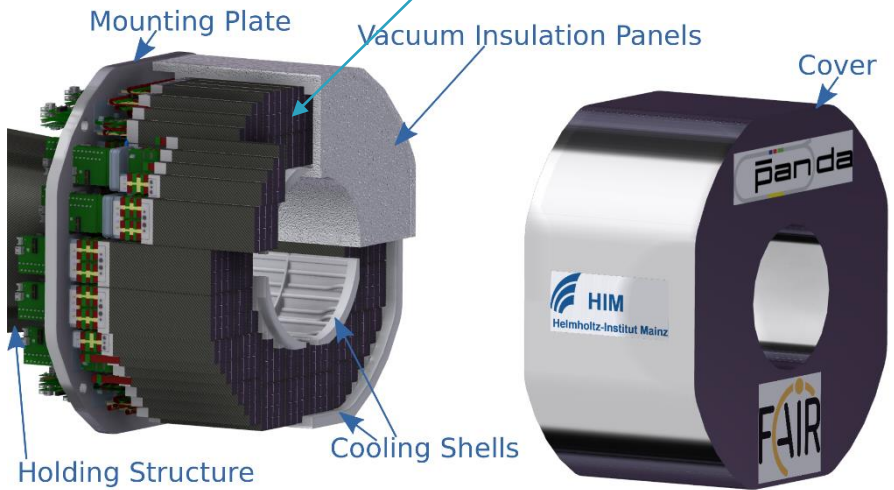
Outline

- Submodule Production
- Detector Calibration
- Status of electronics
- Beamtime Data analysis
- Summary

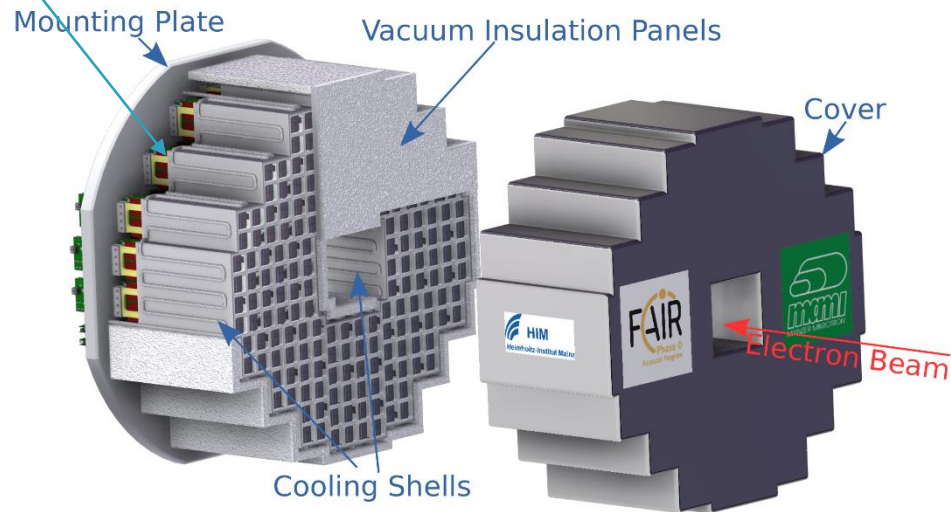
PANDA Backward Endcap



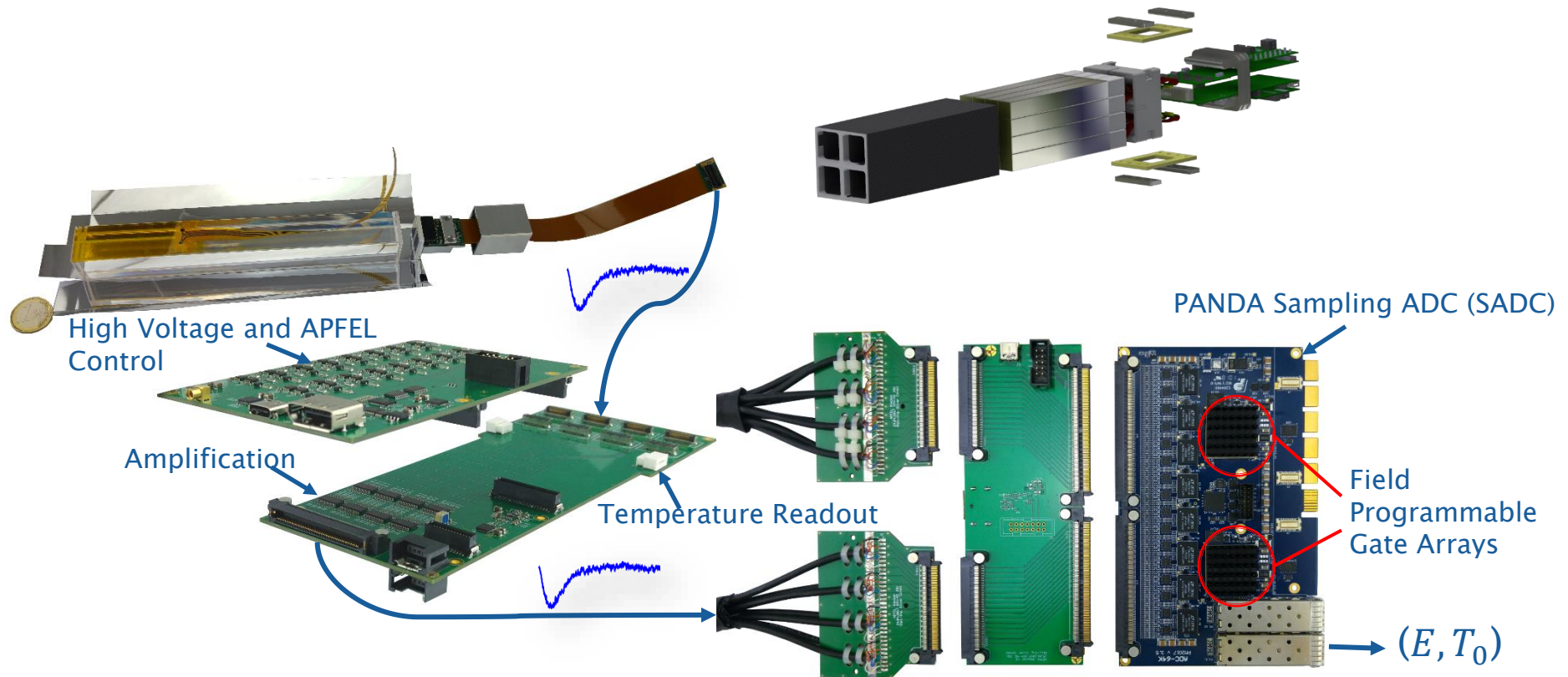
Panda Version



Phase-0 Version



PANDA Backward Endcap

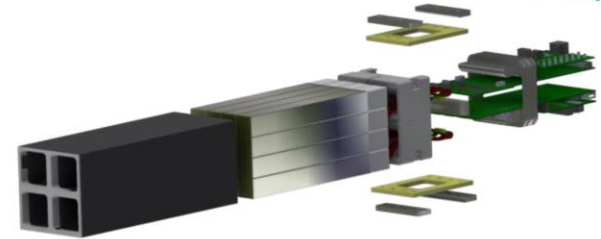
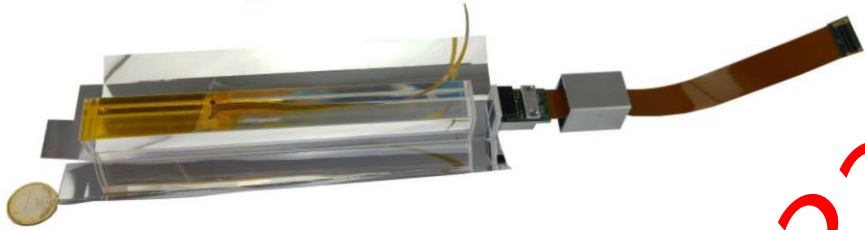


Crystal Gluing

Oliver Noll

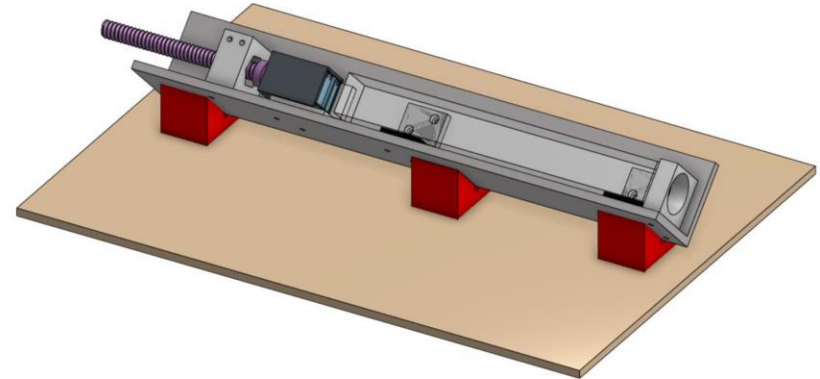
EMP

Crystal Gluing – Lessons Learned



1.6.22

- 40 crystals per week
- 2.5 submodules per week
- Expected time to glue all crystals: 4 Months
- Gießen needs fixtures back
- Design of simplified version
- Prototype is under construction

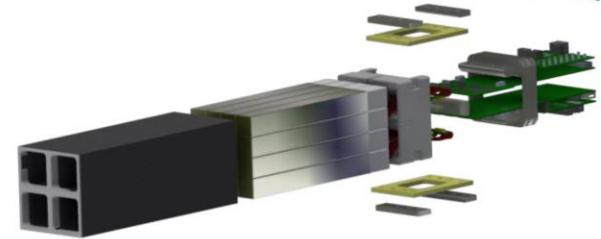
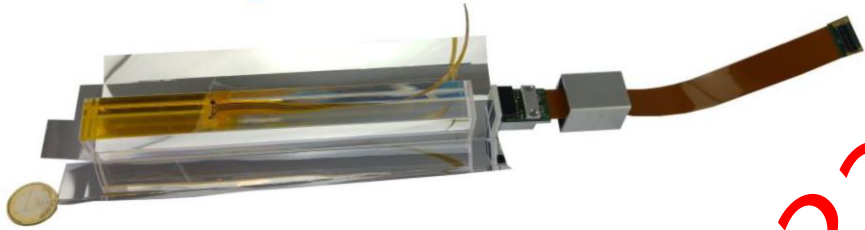


Crystal Gluing

Oliver Noll

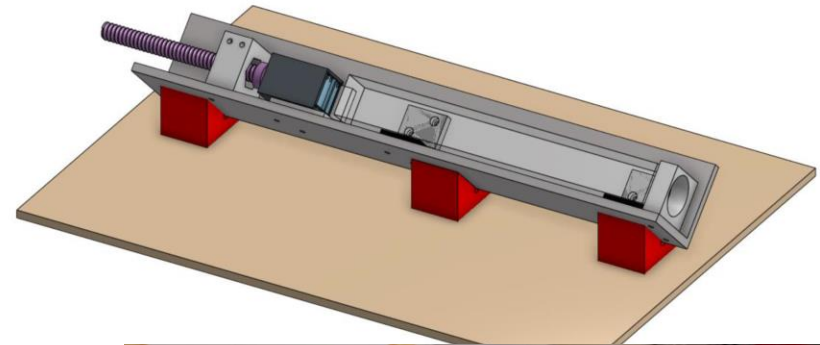
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Crystal Gluing – Lessons Learned



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- Total crystals glued: 450/640
- New Gluing station: one produced and in operation



Submodule Production

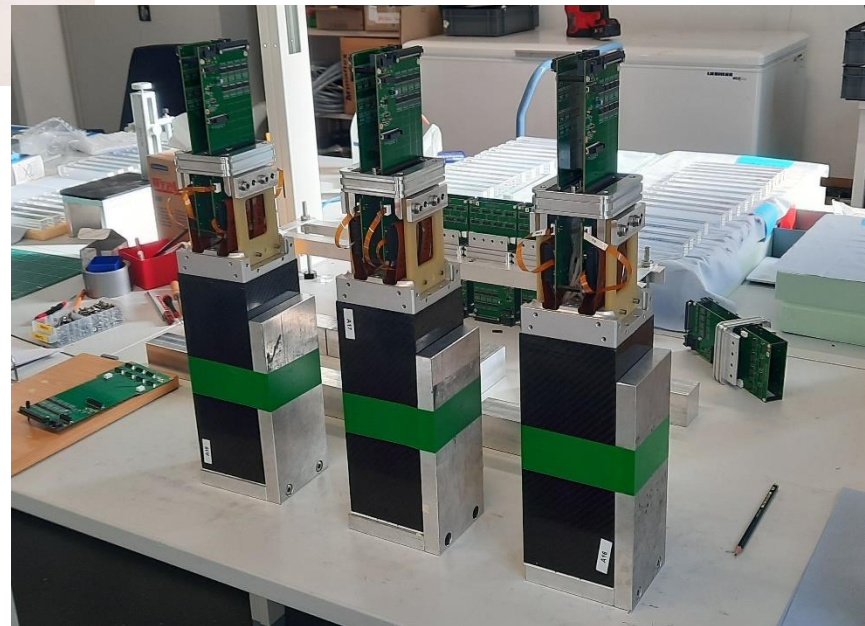
- Submodule assembly (32 full, 16 half submodules):
 - Crystal gluing
 - Mechanical assembly of submodule
 - Electronics pre-check
 - Stopper gluing
 - **Final check and calibration in climate chamber**

Submodule Production



- Submodule assembly (32 full, 16 half submodules):
 - Crystal gluing
 - Mechanical assembly of submodule
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 - **Final check and calibration in climate chamber**

- Production running smoothly
- Total **20** of **32** full subunits completed
- Assembly of all full subunits expected until end of year

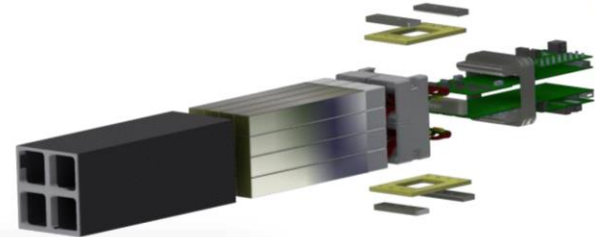


Submodule Calibration

Oliver Noll

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Submodule Assembly and Test Setup



- Delay in production of light pulser system due to chip shortage.
- Found alternatives (little changes at PCB layout)
- In the meanwhile: Master student develops calibration procedure (scripts) with prototypes

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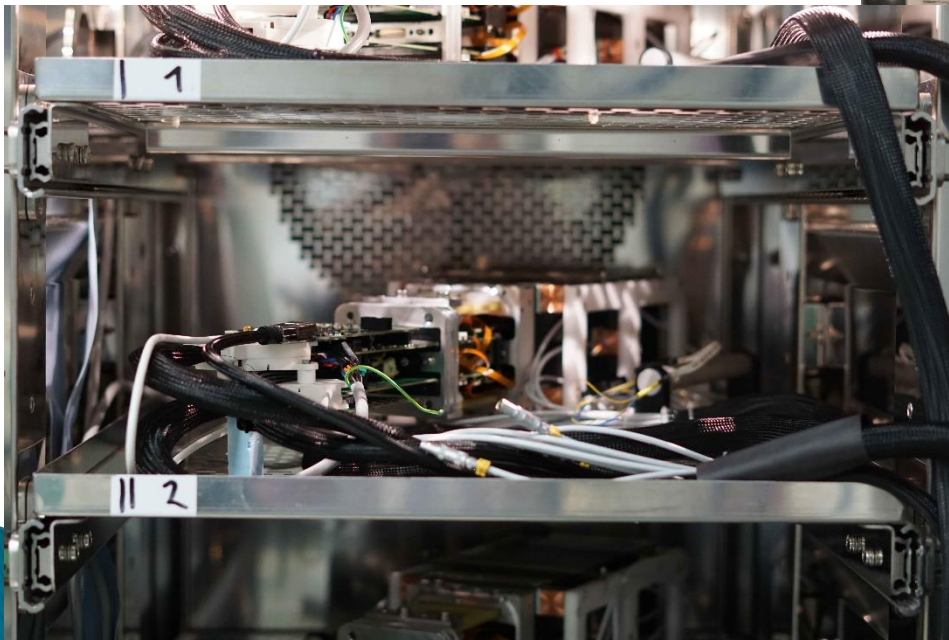
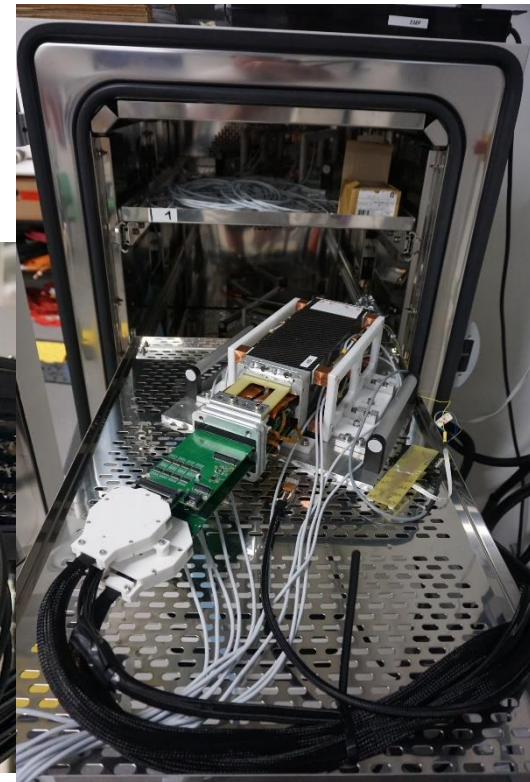
Submodule Calibration

- Lightpulsar system: 3 additional systems built
- 3 Submodules with full readout chain installed in chamber



Submodule Calibration

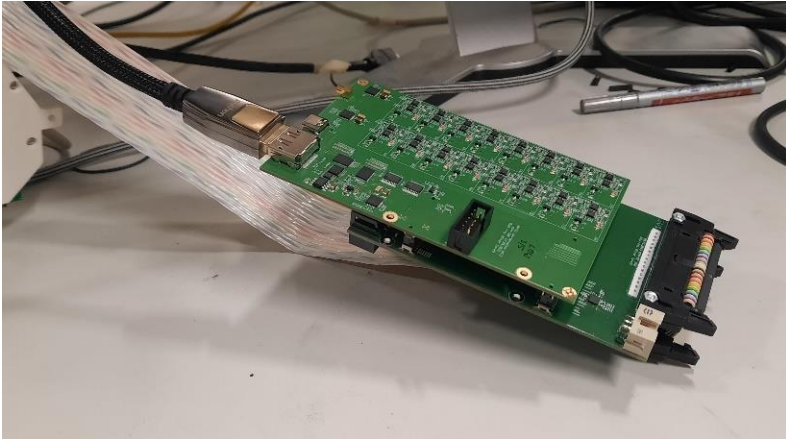
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- Submodule tests at -25° started
- Cosmic ray measurements
- First tests with calibration scripts ongoing

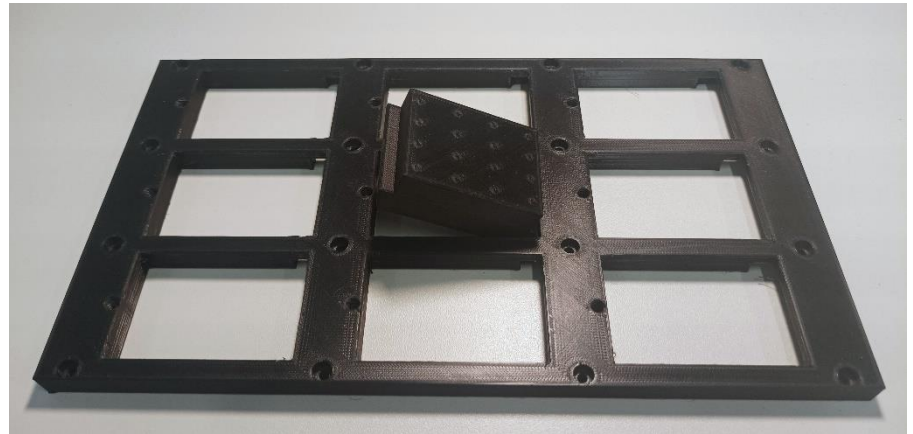
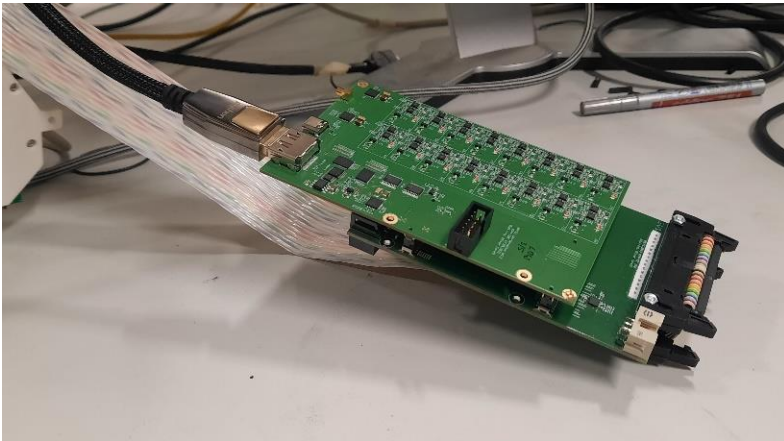
Electronics status

- HV boards:
 - All boards (100) delivered, other parts available as well
 - 16 board pairs will be built until end of year
 - HV Board calibration setup, calibration ongoing



Electronics status

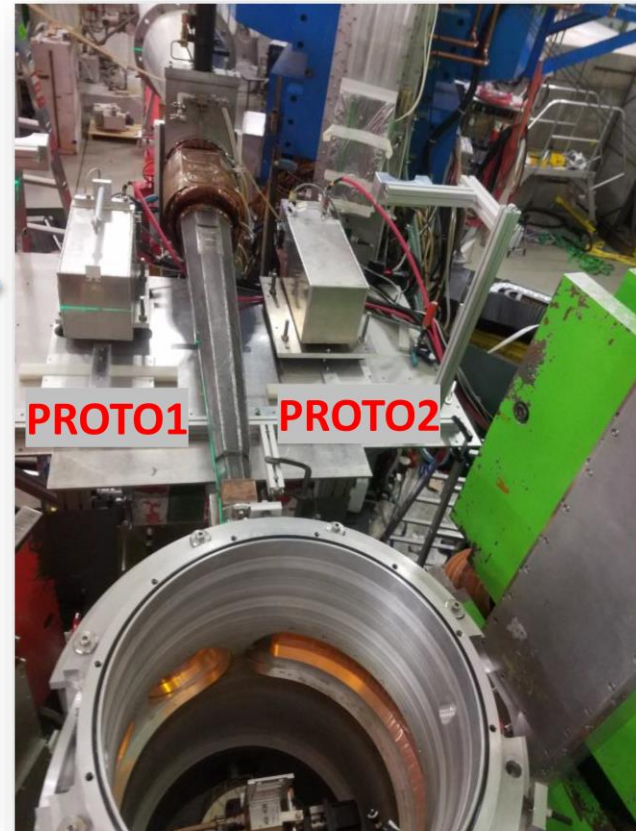
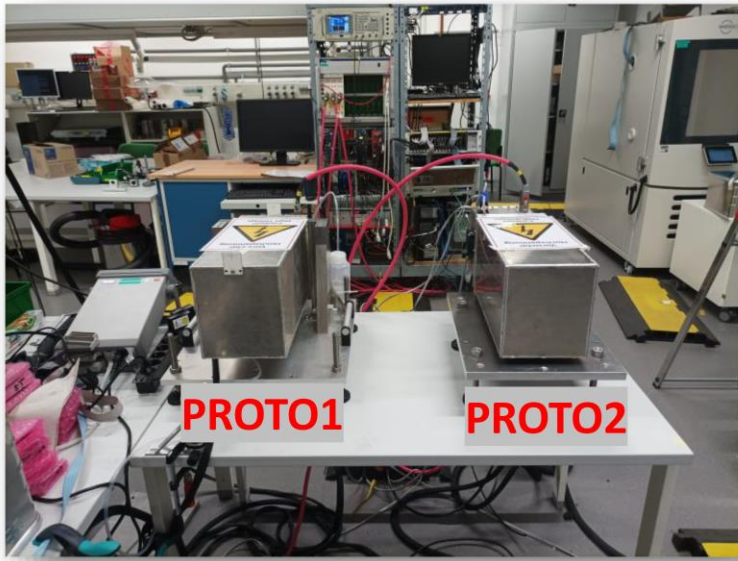
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- Final Lightpulsar system for full detector:
 - $9 \times 16 = 144$ channels
 - 5 slave boards, 1 master board: $5 \times 144 = 720$ channels
 - Connector design has been finalized
 - Materials for full LP system have been ordered
 - Design of boards will be finalized once all components have arrived

Beamtime Data

Phase 0 Test Beam

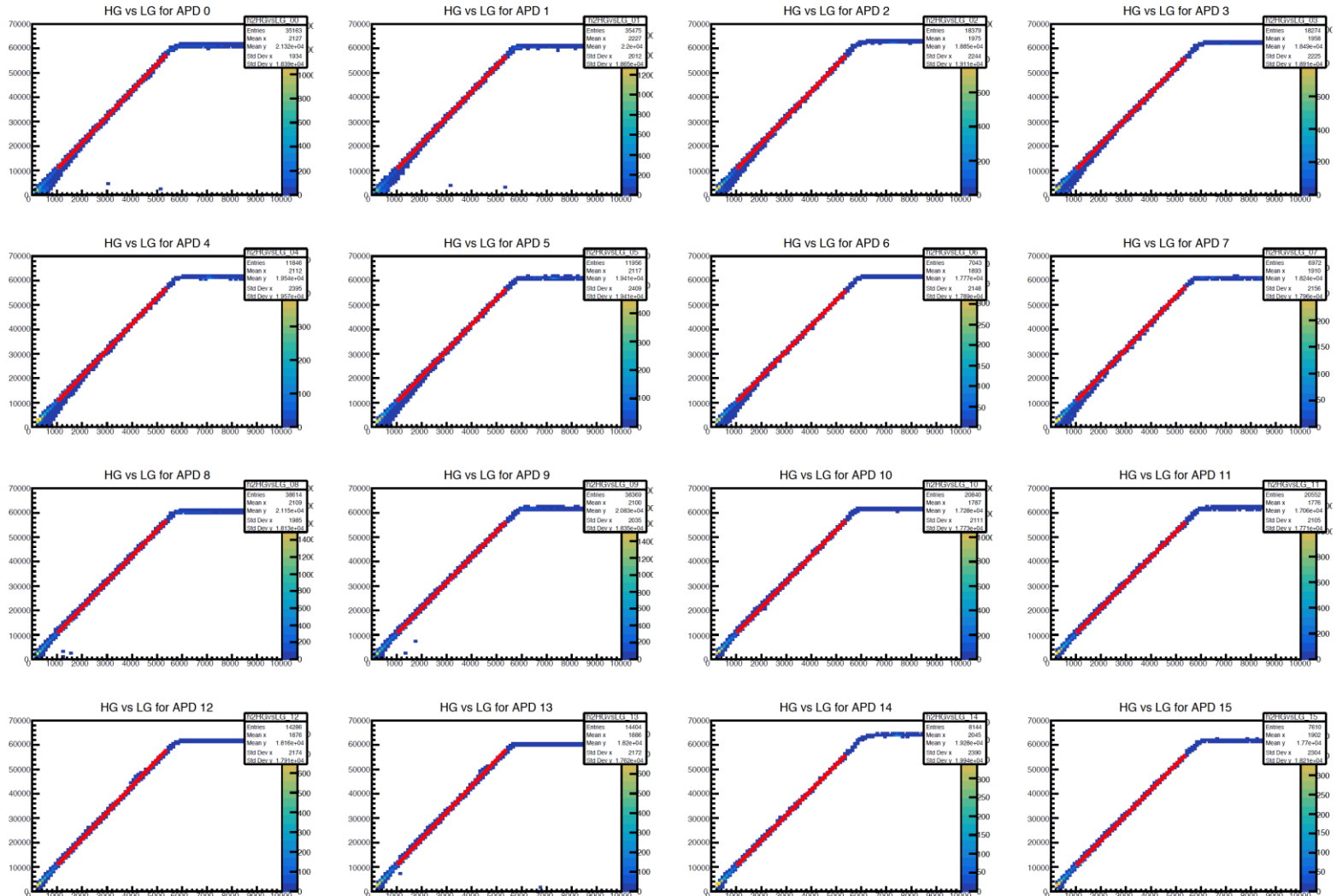


- Beam test in April (20.04.2022)
- Readout with PANDA SADC
- Coincidence measurement with both prototypes
- Coincidence with MAMI A1 spectrometer
- Beam Energy: ~~1.5 GeV~~ 855 MeV

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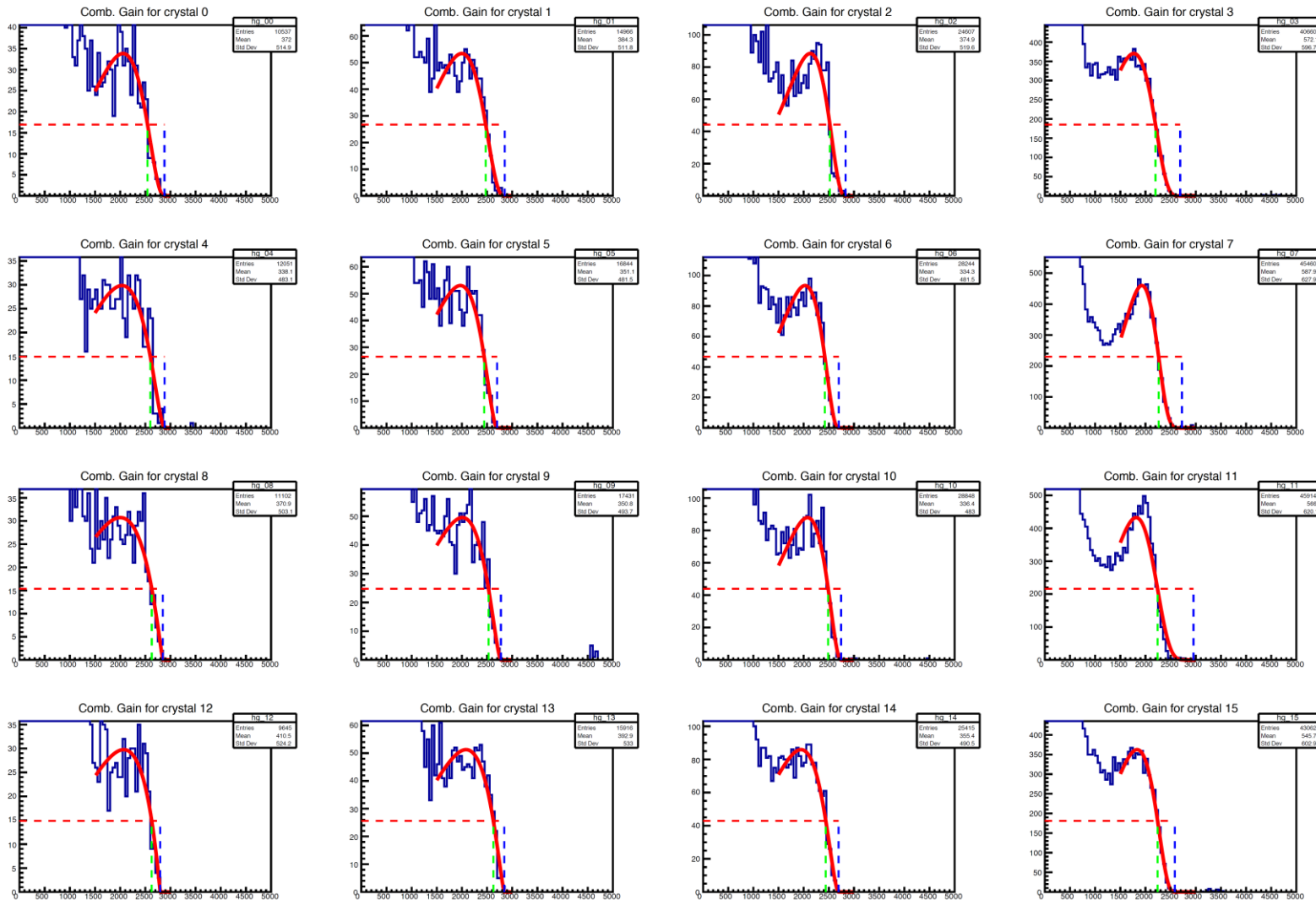
Beamtime Data

- High and low gain of 2 APDs per crystal merged:
 - Use HG if $HG < 58000$, else LG
 - Merge gains of both APDs



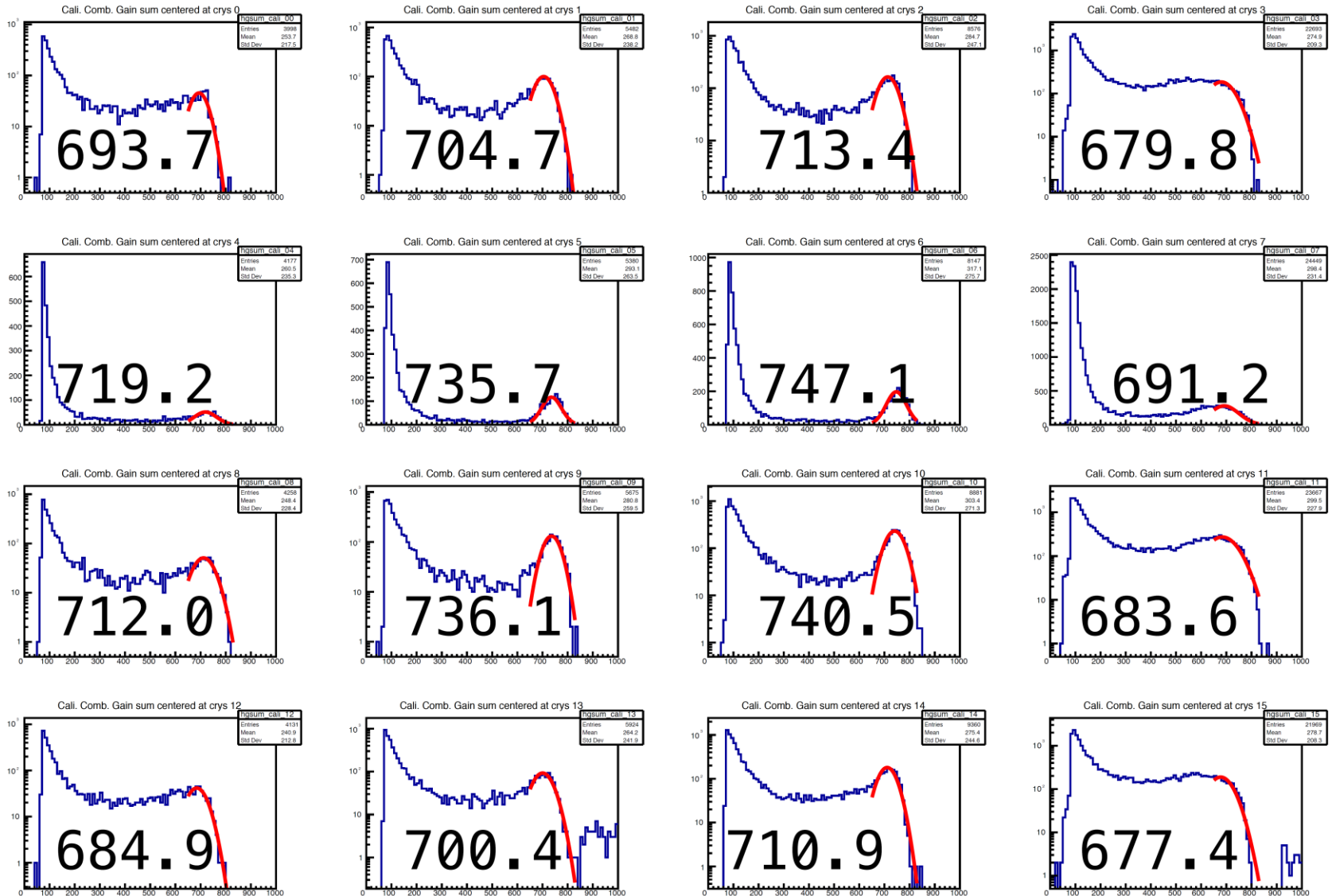
Beamtime Data

- Detector calibration: merged gains of sum spectra for proto 2
- Quasi elastic peak determined from half-maximum of argus fit of the edge



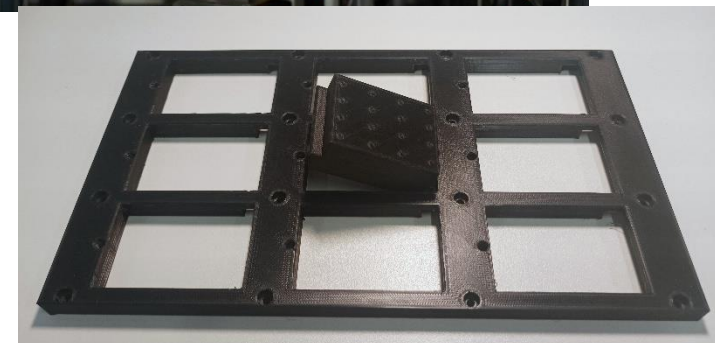
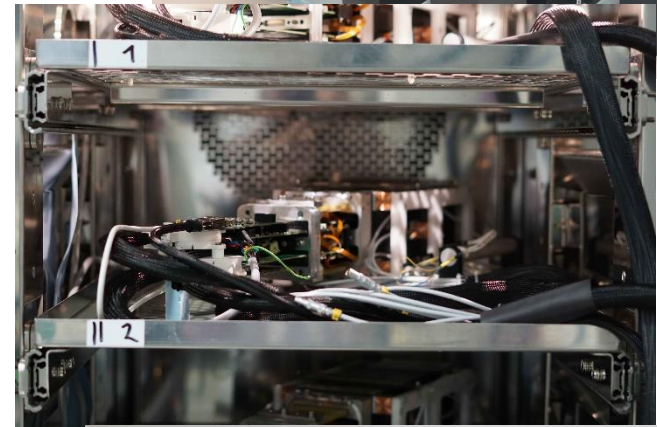
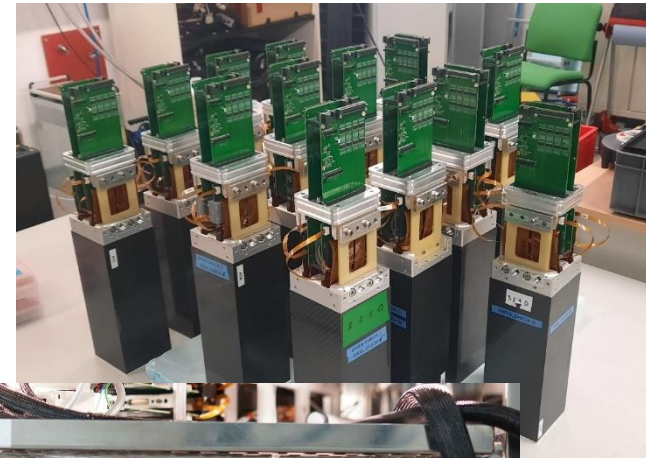
Beamtime Data

Calibrated (half max) Beam data quasi-elastic peak



Summary

- ▶ Submodule production is running smoothly:
 - 450 out of 640 crystals glued
 - 20 out of 32 full subunits finished
 - Production of all full subunits expected end of the year
- ▶ Calibration of submodules ongoing:
 - Climate Chamber setup up and running
 - First measurements (cosmics) and tests of calibration scripts in progress
- ▶ Electronics:
 - Full batch of HV-board production started
 - Lightpulsar system for full detector in development
- ▶ Analysis of beamtime data ongoing: calibration



Thank You!