JUSTUS-LIEBIG-UNIVERSITÄT GIESSEN

Barrel slice assembly

-Present status and ongoing preparations-

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panda

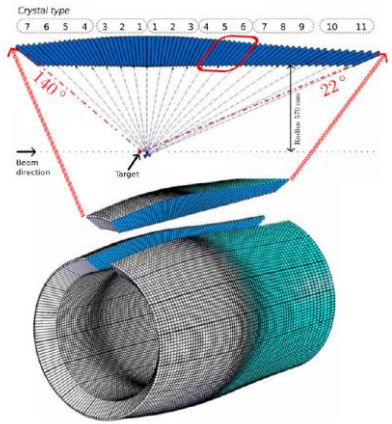
HIC for FAIR
Helmholtz International Center

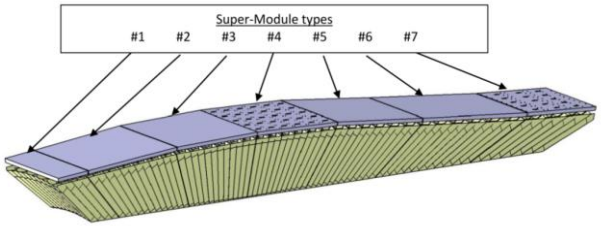
Reminder

•Envisaged milestones:

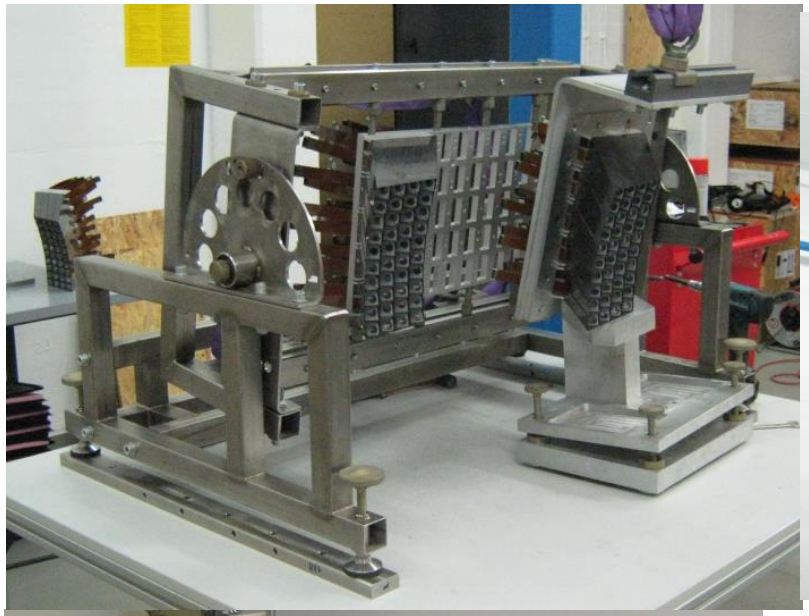
Assembly of 1st full Barrel EMC slice

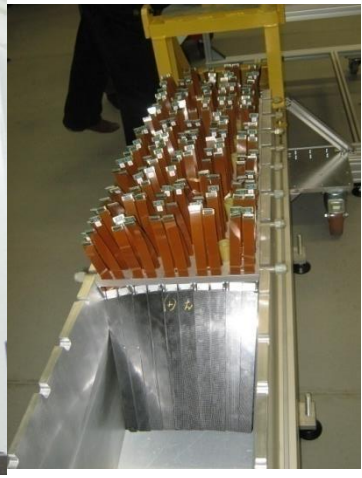
- Infrastructure ✓
- Mechanics (not approved yet) ✓
- 710 detectors ✓
  - 710 crystals in 11 different geometries ✓
  - 1420 APDS
    - Screening including irradiation ✓
    - Matching ✓
    - Glueing ✓
  - Capsules ✓
  - Wrapping ✓
  - •Assembly of 18 modules ✓
  - •Assembly of Supermodules ✓
    - •360 left and 360 right handed APFEL-ASIC with flex PCBs
    - •ASIC housing or fixtures ✓
  - •Assembly of slice (✓)
    - •Cooling
    - •Isolation
    - •Backplanes
    - •Cables
    - •Light pulser fiber coupling





Slice Assembly

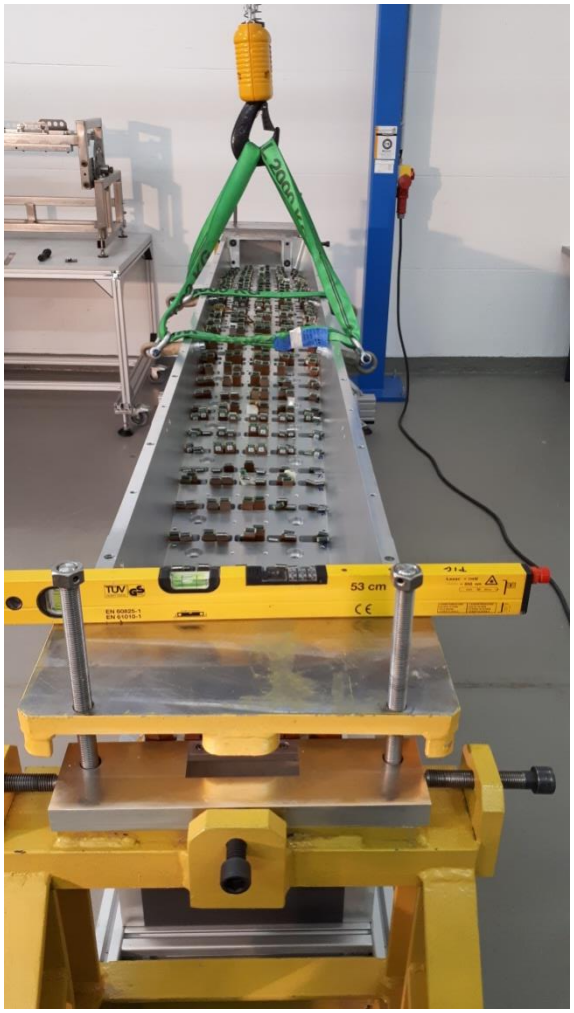


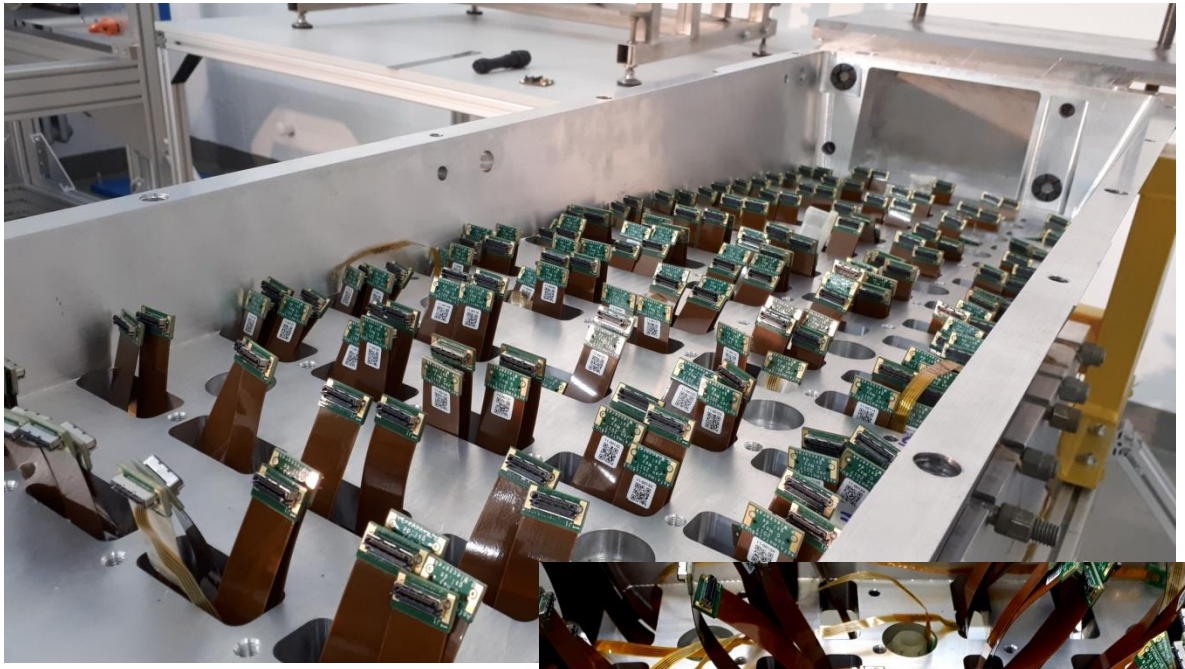


up to super modules finished

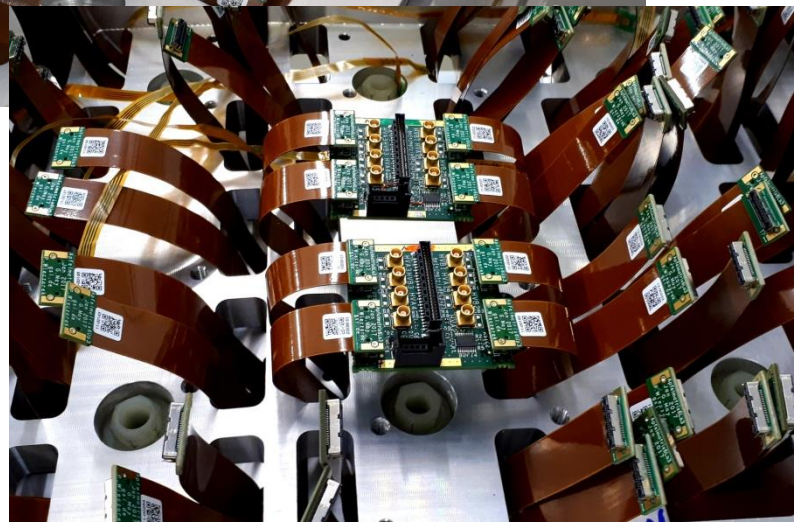
Slice Assembly – Support Beam

Slice Assembly – Support Beam





during lowering process

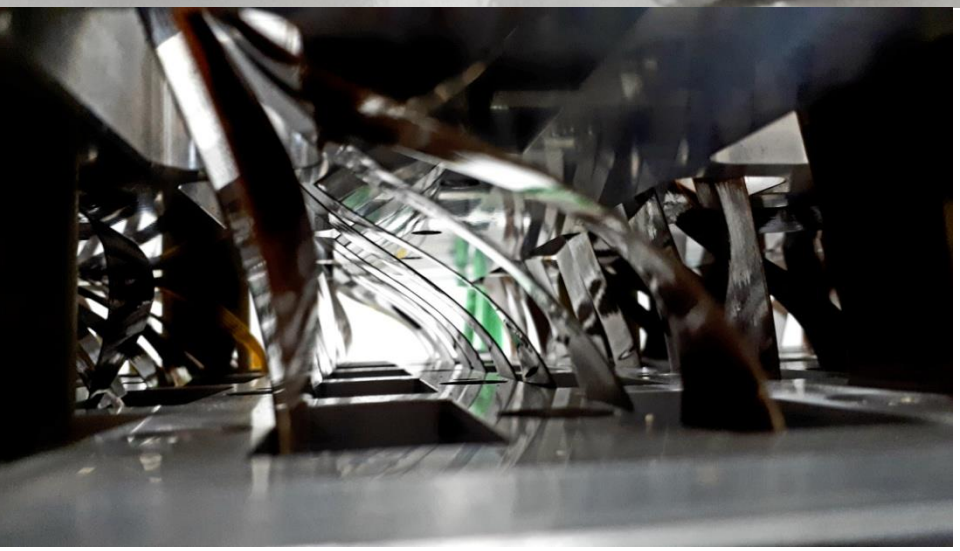


routing of FlexPCBs through support beam ambiguous

Slice Assembly – Support Beam

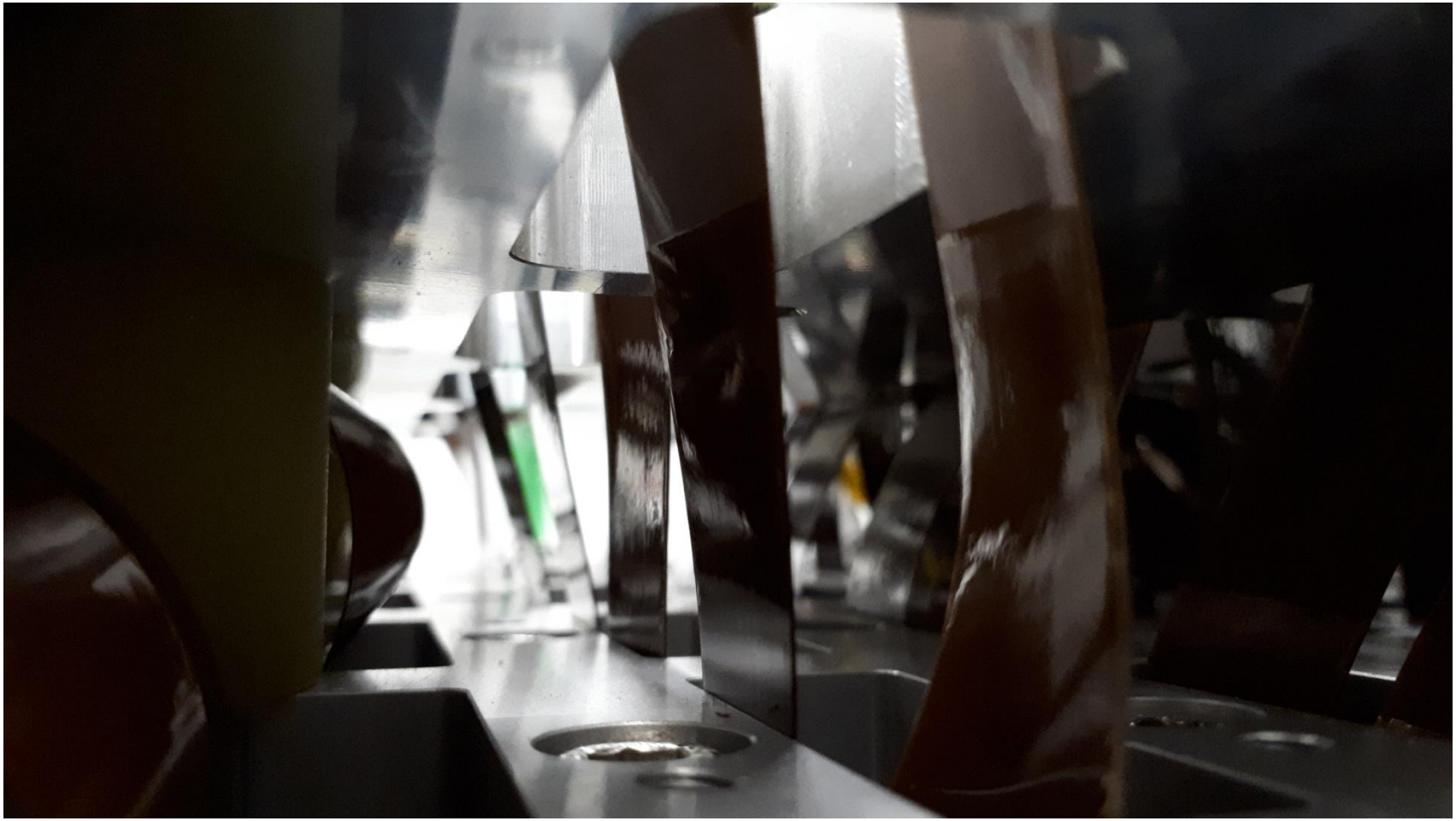
final position

Slice Assembly – Support Beam



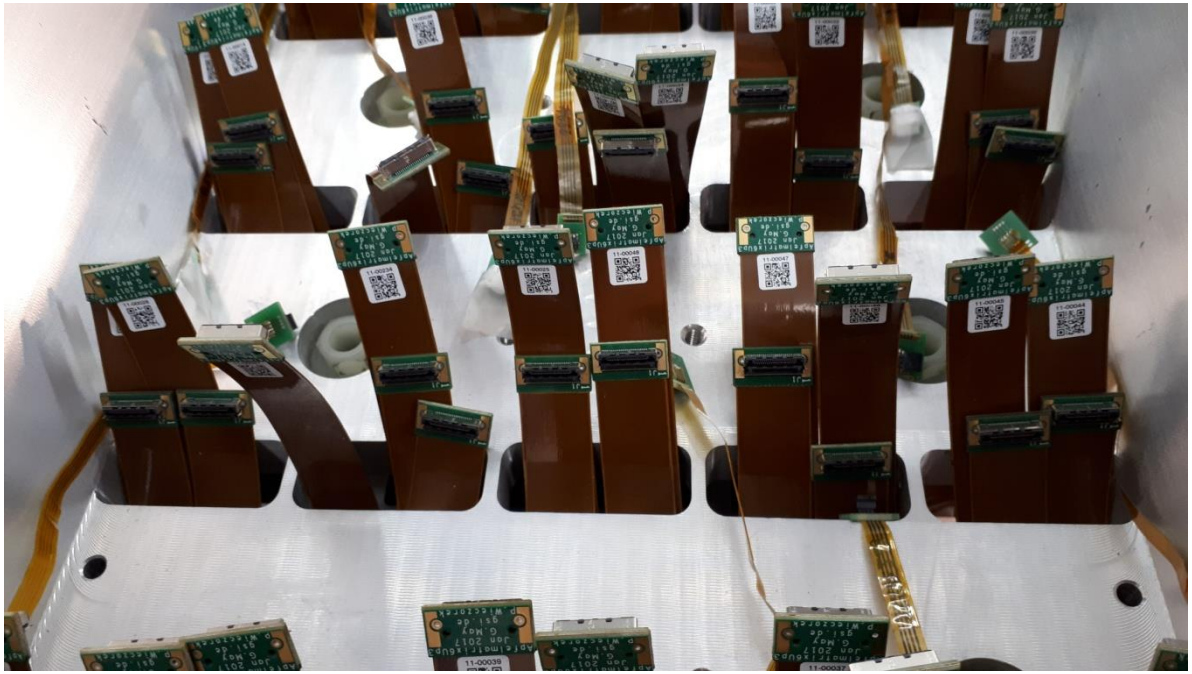
thermal insulation
difficult

Slice Assembly – Support Beam



almost ideal case of openings at some positions only

Slice Assembly – Support Beam



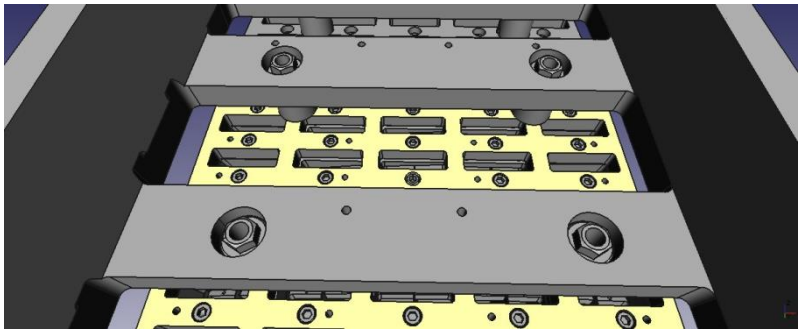
especially downstream: FlexPCBs too short

Slice Assembly – Support Beam – Space Problem

Slice Assembly – Support Beam – Space Problem

Proposals:

1. Change support beam design
   - Mount backplanes on thin rails in openings
   - No FlexPCB routing problem
   - Stability needs to be evaluated

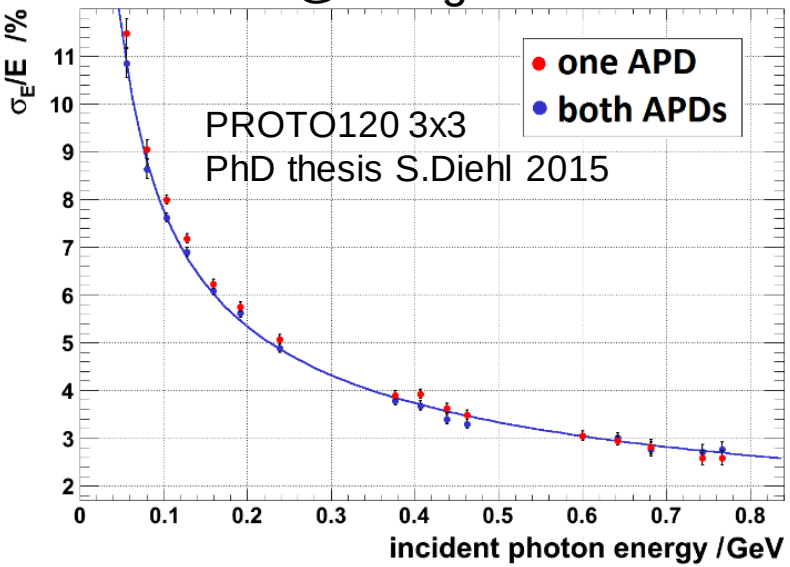


2. HitDetASIC

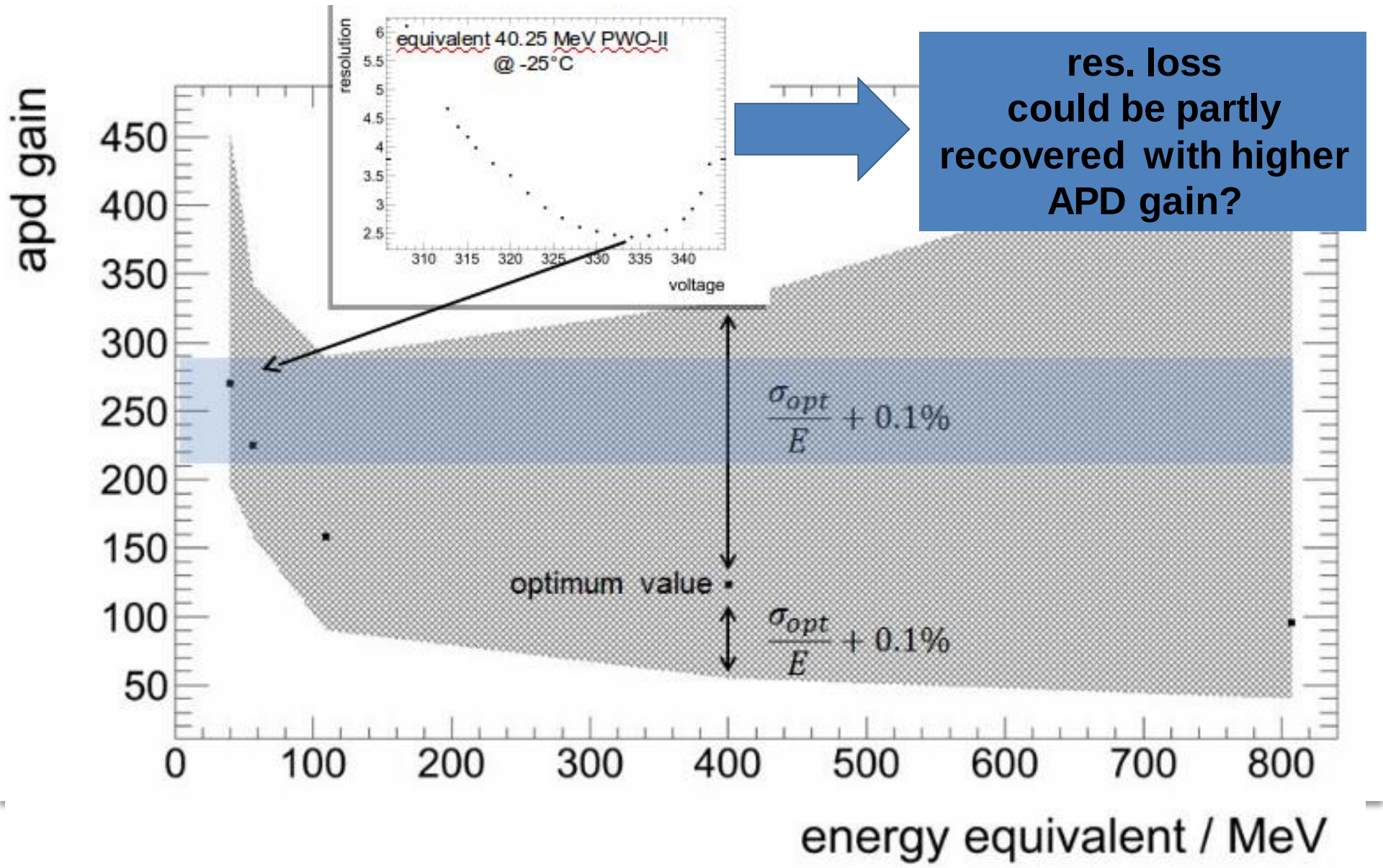
	ext. ADC	HitDet.
Analogue Signals	16 pairs	
SerialAdapter	4 pairs	
Serial clock		1 pair
Upstream data		1 pair
Downstream data		1 pair
	20 pairs	3 pairs

➡ talk: H.Flemming

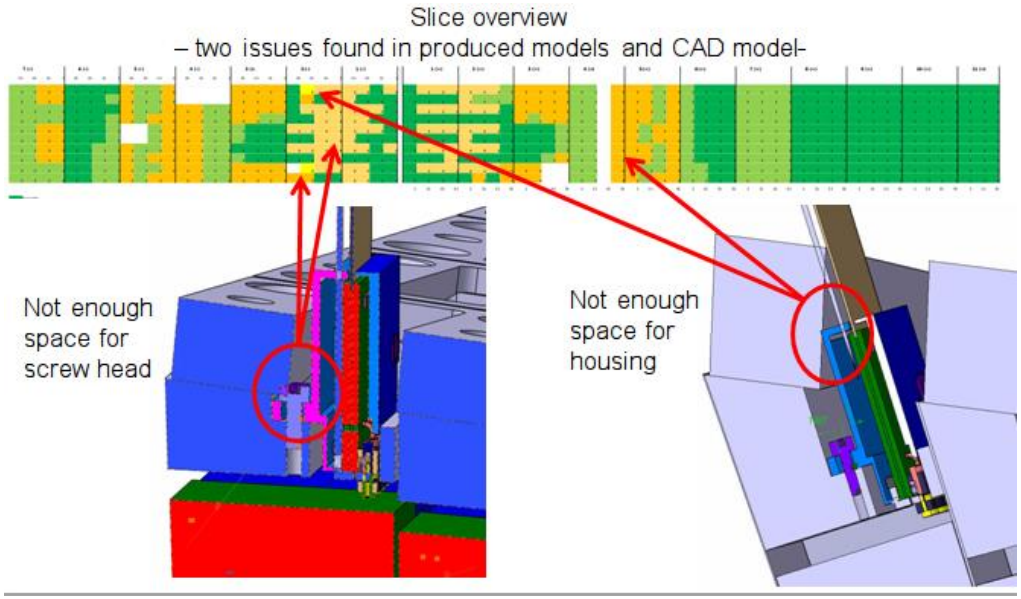
3. Two channel read out (instead of four)
   - one APD @ optimized high gain
   - one APD @ low gain



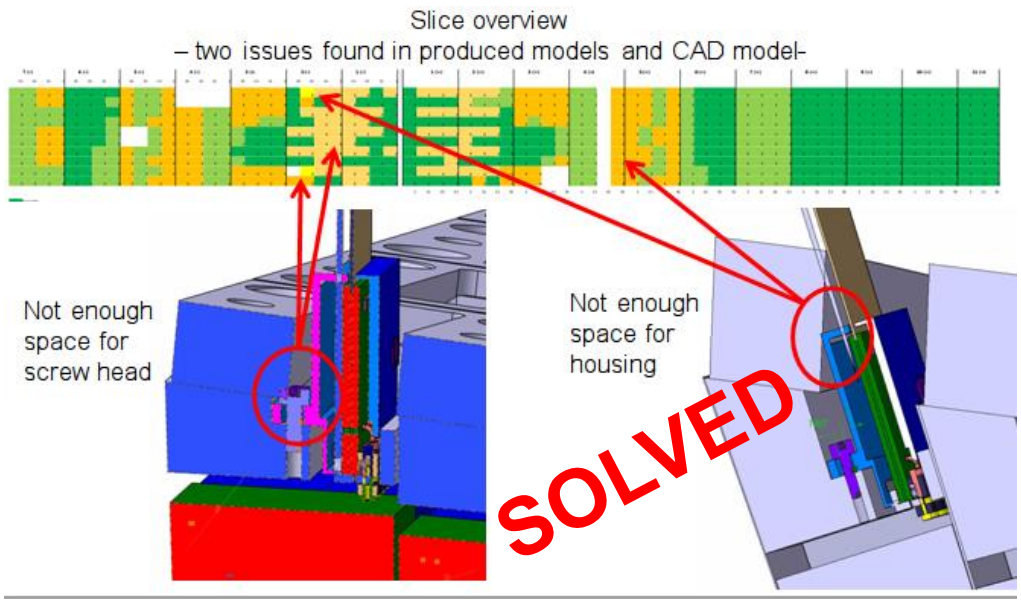
Old Measurement With Basel Preamp

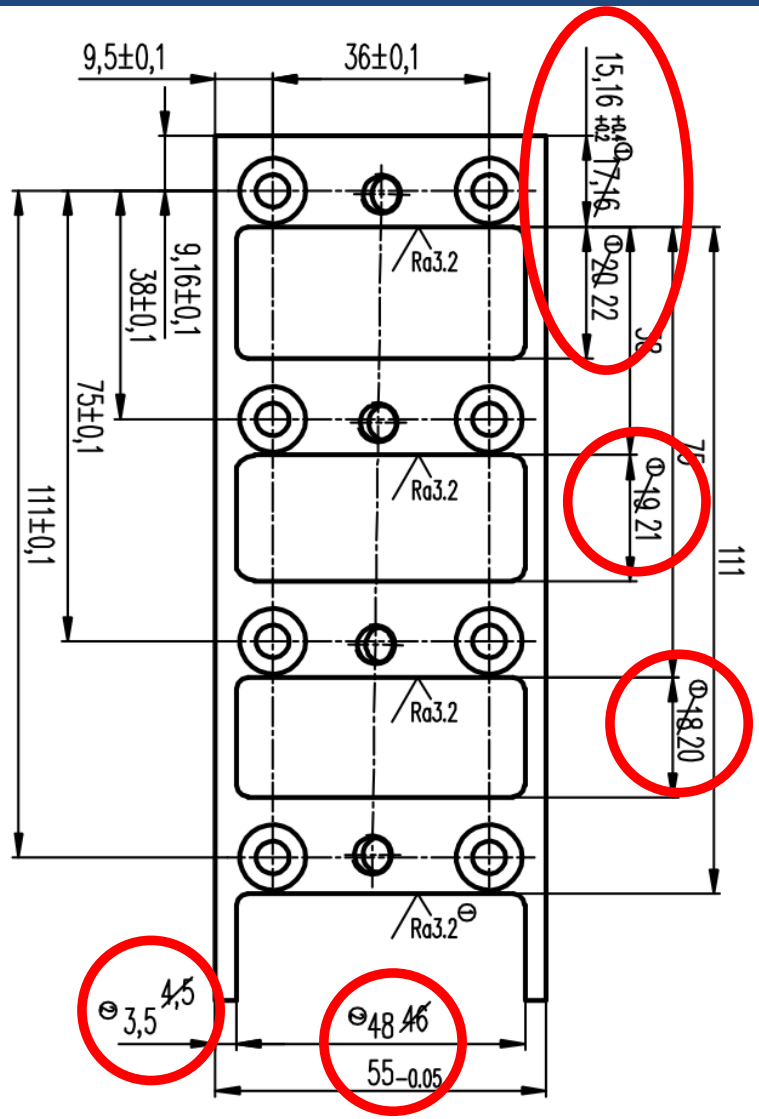


Barrel Slice Acceptance



Barrel Slice Acceptance



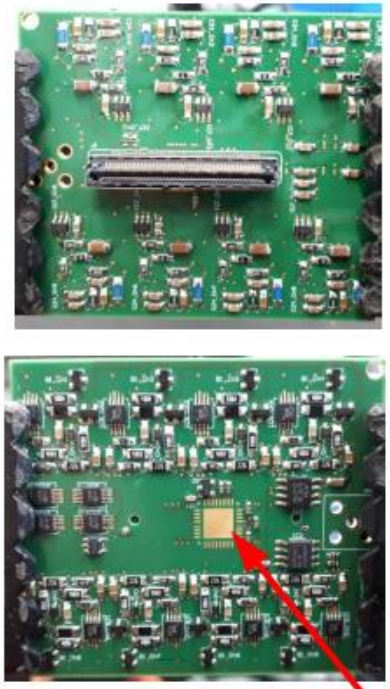


After some minor changes in module plates and super module plates:

Everything up to super modules officially accepted

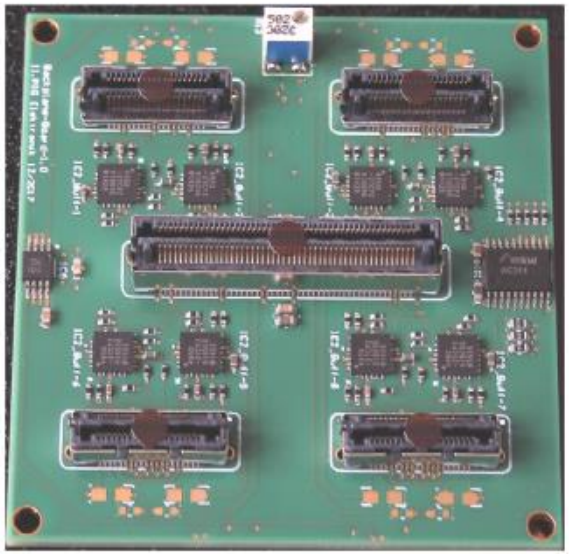
Backplanes

- HVD for control of 4-crystal-unit (8 APDs) in final prototype tests
- Backplane base PCB with line drivers in testing phase
- Test station for test and calibration of the 2-PCB sandwich under development



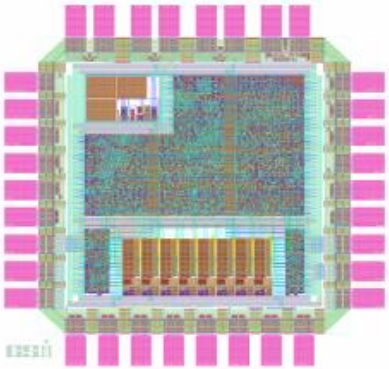
8-ch HVD final prototype
size: 6 x 5.5 cm²

Serial Adapter ASIC
(next slide)

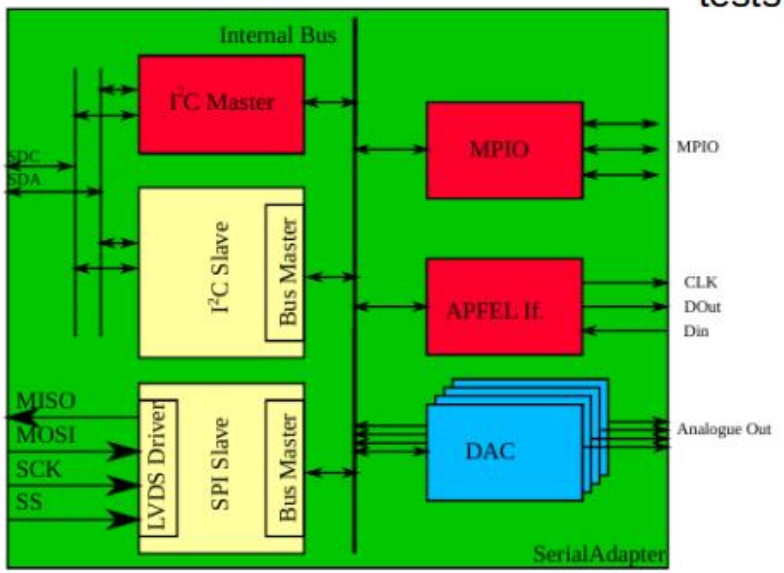


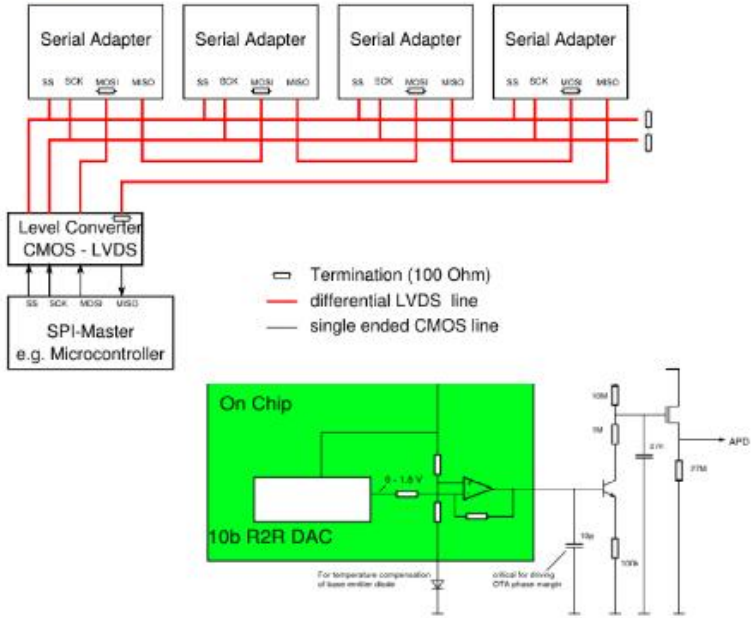
Backplane base PCB
size: 5 x 5.5 cm²

Backplanes – Serial Adapter ASIC



- ASIC for bundling several busses and functionalities on backplane electronics
- Still under testing with breakout PCBs and bonded ASICs → encountered some problems with wire bonding reliability
- Some ASICs already packaged in QFN32 and tested, so far everything seems functional, deeper tests pending





Summary

- Support beam mounted
  - Routing FlexPCBs difficult
  - Openings not optimal

- Space problem inside support beam, three Proposals:
    - Redesign support beam
    - HitDetASIC
    - Reduced read out

- Everything up to super modules officially accepted

- Backplane design including serial adapter ASIC in testing phase

- Crystals for the second slice ordered