



Status Forward Endcap EMC

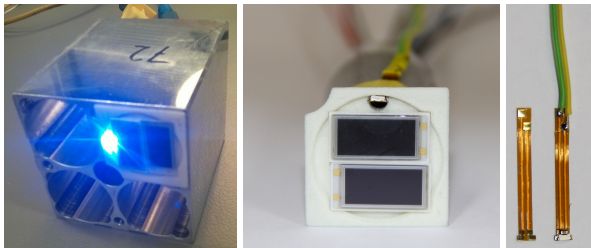
PANDA Collaboration Meeting 20/1, GSI, Darmstadt, 2020

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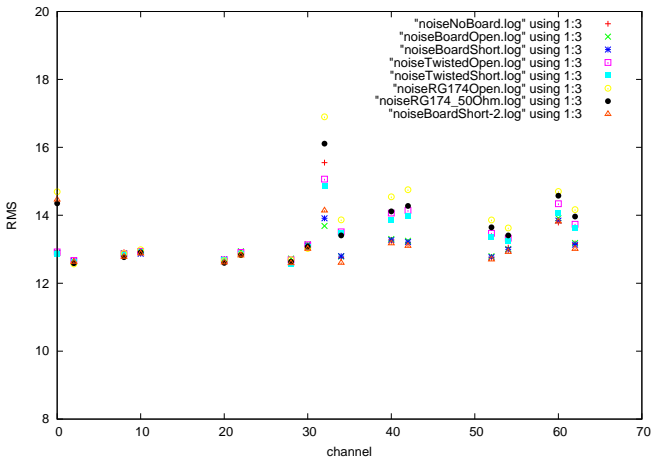
- Annealing LED-Caused Noise in APD Submodules
- APD Submodule Manufacturing
- APD Screening
- SADC Cooling Crates
- Forward Endcap Cooling

LED-Caused Noise (APD Submodules)



- November meeting: Reported trouble with noise introduction seen in Bonn test stand
- Obviously caused by annealing LEDs sitting close to APDs (“blue” rather than “red”)
- Unsuccessful trial of reproduction in Bochum test stand (room temperature only)

LED-Caused Noise (APD Submodules)



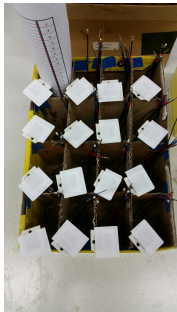
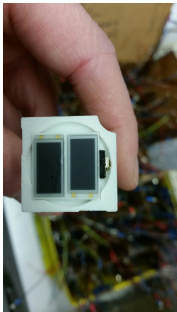
- RMS of noise (in SADC channels) versus read out channel number
- 8-crystal submodule (16 read out channels)
- One defective (shielding?) unit: two channels w/ excessive noise (independent from LED test)

LED-Caused Noise (APD Submodules)

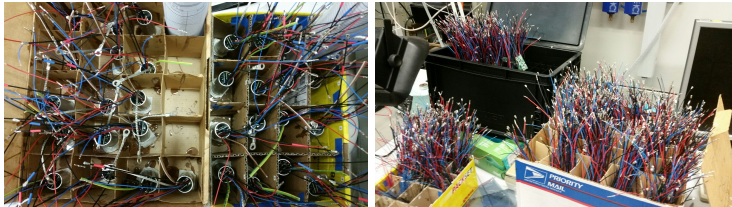
- No noise contribution to “red” APD channels (being further away from LED)
- Worst case (“blue” APDs):
about 1 ADC channel additional noise contribution
- Translates to $(12 \text{ GeV} / 8192) : 16 \text{ (high gain)} = 92 \text{ keV}$,
integrated in feature extraction over (say) 9 channels:
 $92 \text{ keV} : \sqrt{9} = 31 \text{ keV}$
- Several cabling conditions for LED current line tested
(shielded, twisted pair cabling, ...)
- From these figures we derived the conclusion to restart APD submodule production
- Bonn people confirmed lower noise figures when moving to second test stand

APD Submodule Manufacturing

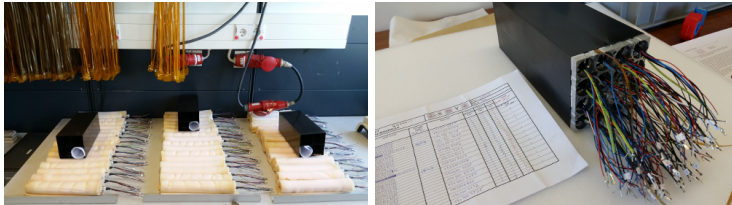
- Several minor modifications in unit-building:
 - ▶ Ease/speed up manufacturing
 - ▶ Prevention of need for repair/delays
- APD pin holes closed by wax, LED hole closed by plastic bars (prevention of casting compound loss)
- Protective self-adhesive covers on APDs



APD Submodule Manufacturing

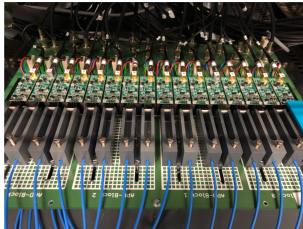
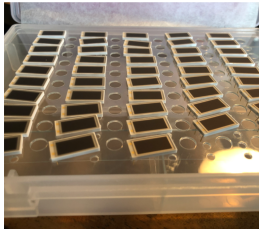


- Currently about 20 APD submodules built
- Production rate up to 5 submodules per week
- At least 40 net weeks needed for completion of FWECE submodules

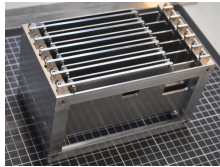
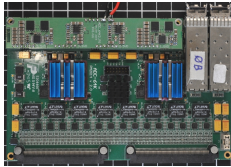


APD Screening

- Regular screening/irradiation ongoing
- Temporary lack of irradiated APDs in January
(Forced vacation issues of radiation protection person at Strahlencentrum GI)
- Current numbers:
 - ▶ Screened/irradiated 13000
(44% of whole(!) EMC)
 - ▶ Matched (on demand):
1000 (corresponding to about 30 submodules)

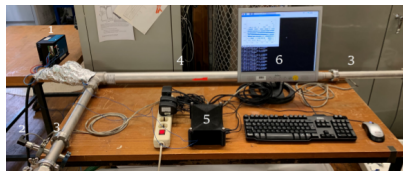
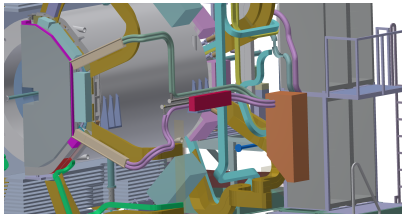


SADC Cooling Crates



- SADC cooling crate design needs modification
- Backplane PCB redesign (board distance)?
- Power supply redesign
- PS cooling inclusion: extension of cooling flanges
- Collection of all final parts in Bochum, check of what needs to be redesigned
- Design work: Still KVI???
- Manufacturing of crates: Bochum, Bonn? Not KVI!

Forward Endcap Cooling



- First working coolant heater available now
- Running different tests on pressure drop, heating performance etc. (w/ Orsay chiller only yet)

