Forward Endcap

Thomas Held

Ruhr-Universität Bochum
Institut für Experimentalphysik I

LVI. PANDA Collaboration Meeting, Bochum
March 1st, 2016

RUHR UNIVERSITÄT BOCHUM RUB

panda

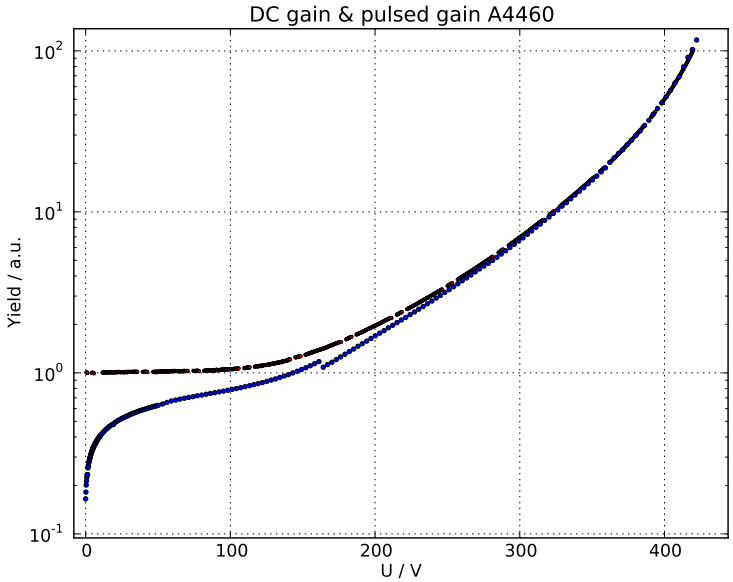
Topics

- Subunit manufacturing
  - VPTT subunits
  - APD subunits
    - Screening (AC characterictics)
- Buildup of forward endcap
  - Front and back covers
  - Thermal insulation
  - Cooling

Subunit manufacturing

- VPTT subunits: All parts available for production:
  - Mechanics: Inserts, mount plates, interface pieces, screws (order)
  - Cables: HV, LV, Signal
  - Fibres (light pulser coupling)
  - Carbon alveoles
  - Photo tubes (screened and sorted)
- Need to discuss mirror foil crystal covers treatment (backward endcap people)
- APD subunits: Need to AC screen APDs for grouping (gain, gain gradients (T, U))

APD AC/DC characteristics

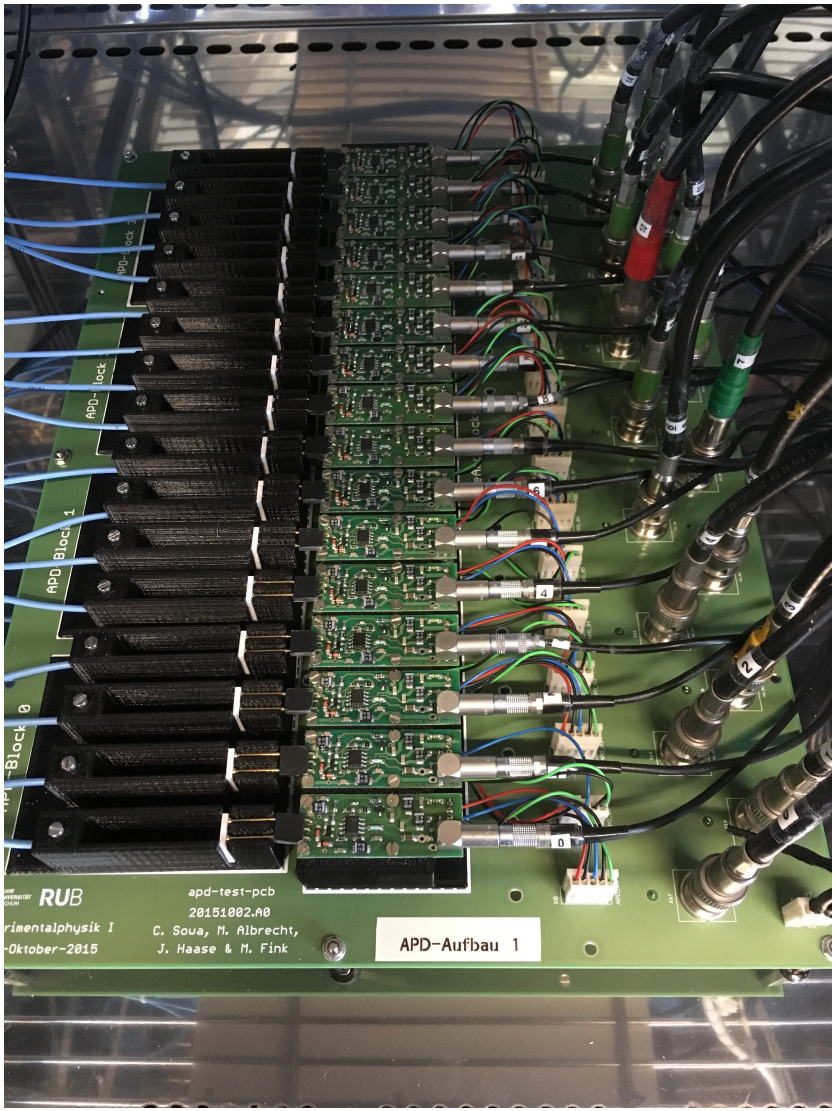


- Different APD characteristic curves (yield vs. bias voltage) for AC (light pulser) and DC measurement
- APD capacity and coupling/input capacities of preamp act as charge divider:
  - Varying (bias voltage dependent) APD capacitance in parallel with coupling/input capacitance of preamp

APD AC/DC characteristics

- In principle, knowing the contibuting capacitances one may be able to convert AC to DC curves
- However, on real APDs/preamps it seems to be impossible to quantitatively 'calculate' an AC curve form the corresponding DC one (and vice versa)
- Therefore it is mandatory to take AC curves for all APDs (that will go to Forward Endcap)
- Barrel (Backward Endcap?) will not neccessarily need that 'pairing' precision as they go for individual HV trimming per channel

APD screening

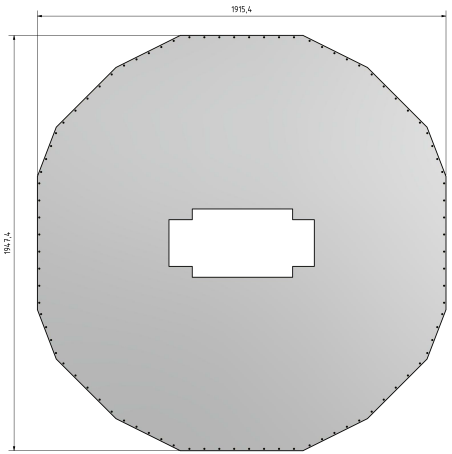


- New ruggedized, precise and easy to handle design: combination of PCBs and 3D-printed structures
- Currently: Two setups ready to screen 16 APDs each at once
- Plug connections of APDs to preamps (gold connectors, APD-lab)

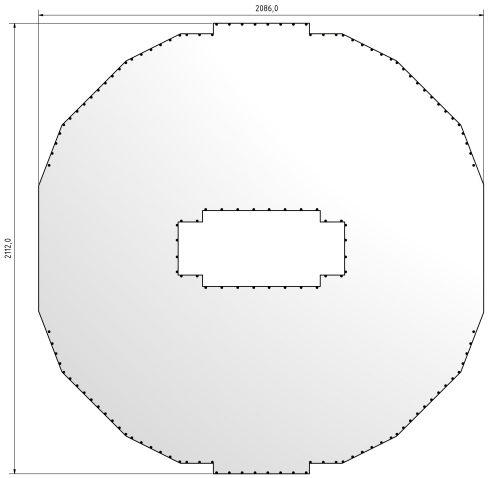
APD screening

- Two new fully automated climate chambers (-40...180 ^{o}C)
- Plan: Two 16-APD setups per fridge
- Currently limited by readout
  (number of suitable ADCs or shaper modules)
- 8 h per run (AC or DC)

Buildup of Forward Endcap: Front and Back Covers



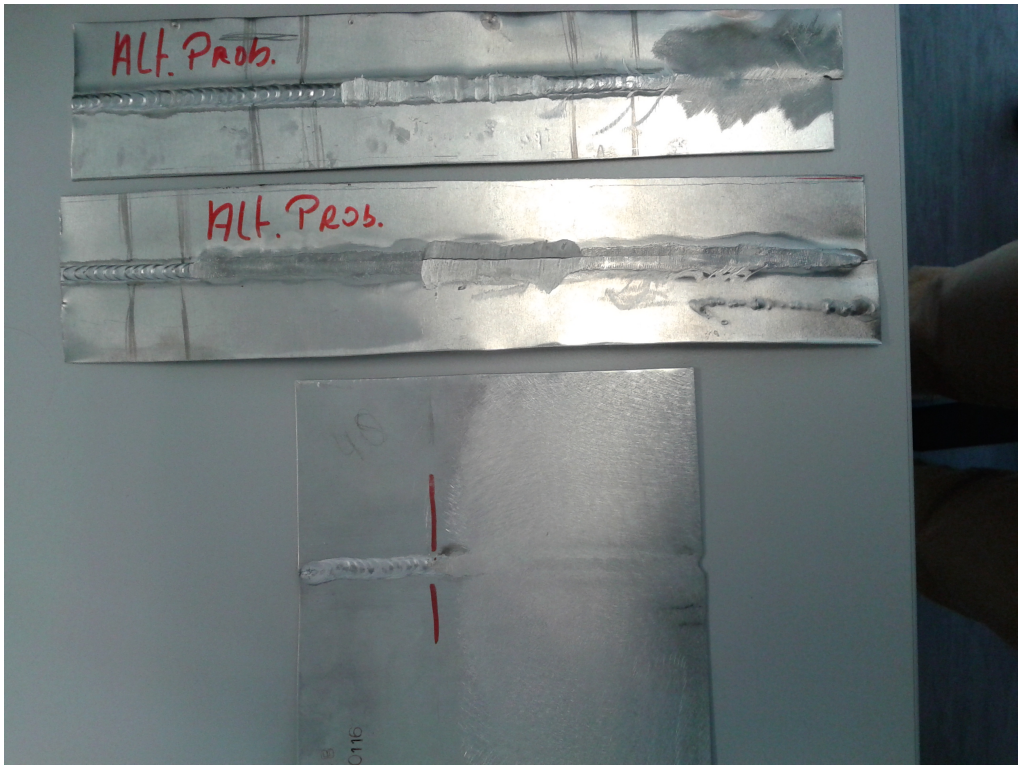
Front Plate (thickness= 0,8 mm)



Back Plate (thickness= 3 mm)

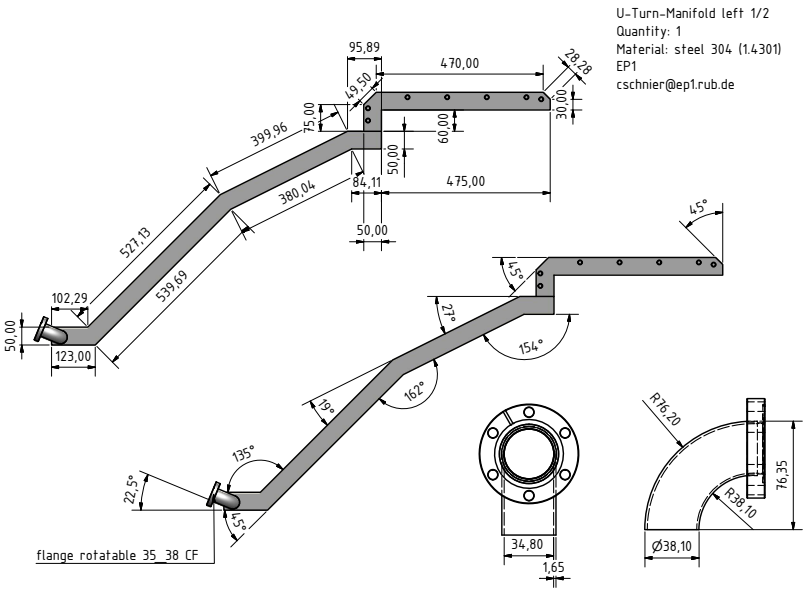
- Front and back cover plates of forward endcap:
  0.8 mm / 3.0 mm aluminum
- Covers span about 1.9 x 1.9 m^2 / 2.1 x 2.1 m^2
- Impossible to find aluminum sheets of this size for the end user
- Need to weld covers from two sheets each

Buildup of Forward Endcap: Front and Back Covers



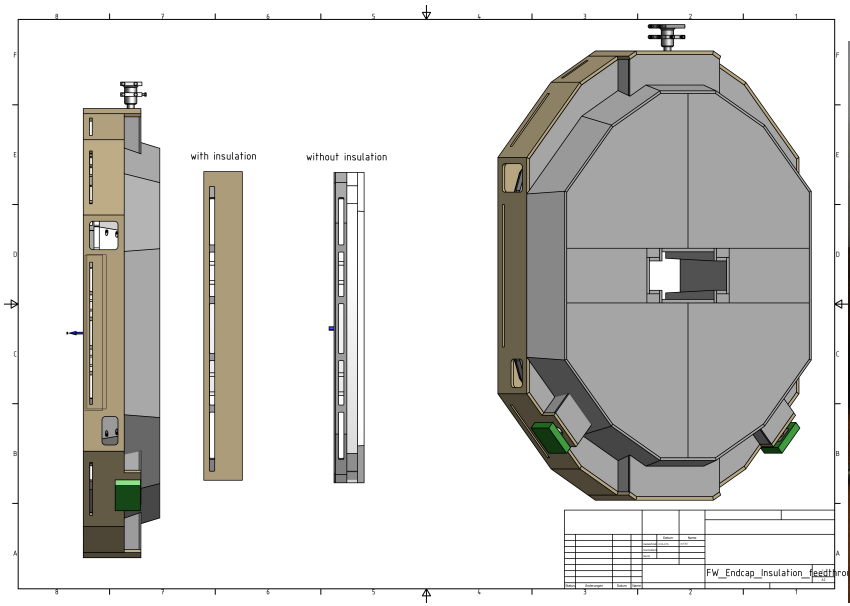
- Challenge: Welding of 0.8 mm front cover w/o distortion of plate, w/o 'visible' weld
- Finally found a welding workshop in Bochum (Mobylas) able to do the job (test pieces...)

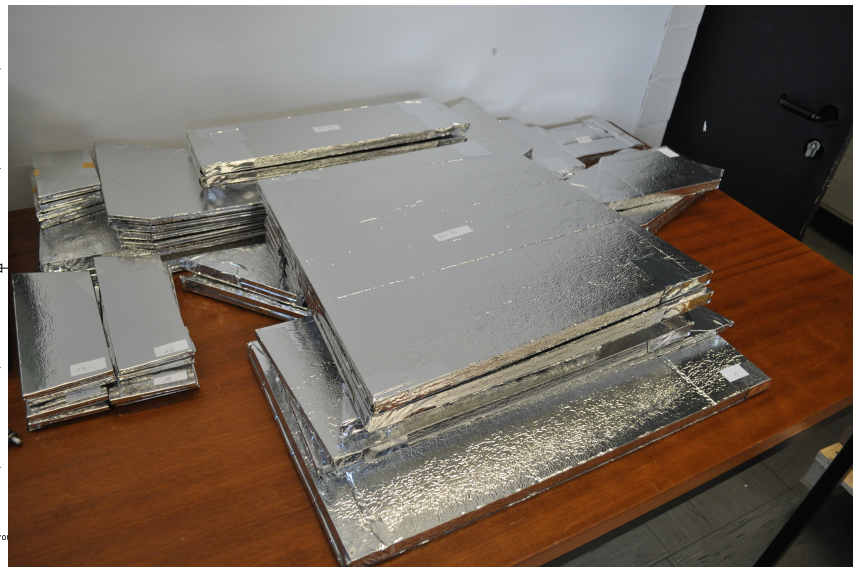
Buildup of Forward Endcap: Cooling



- Chiller system installed in the lab (Orsay people)
- Nearly all parts for first flow test available
  - Swagelok-connections to backplate
  - Missing distributor manifolds ('bones') will be made at KVI (6 pieces)
- Feel free to take a look at the laboratory

Buildup of Forward Endcap: Thermal Insulation





- Up to now we got about 80% of the VIP panels for thermal insulation
- All delivererd panels checked and stored
- Full installation possible only in Juelich (need to dismantle endcap frame for transport)

Buildup of Forward Endcap: Thermal Insulation