Feedback on cooling unit

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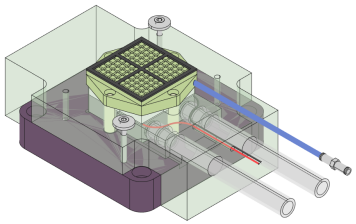
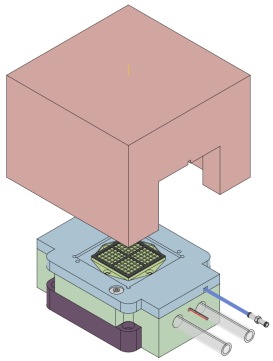
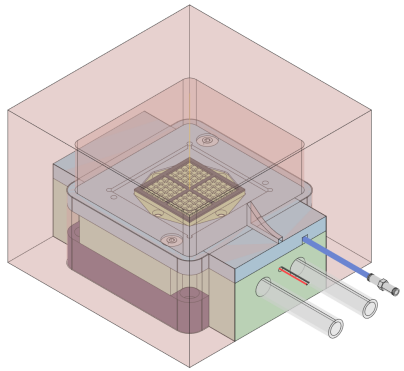
Cooling unit

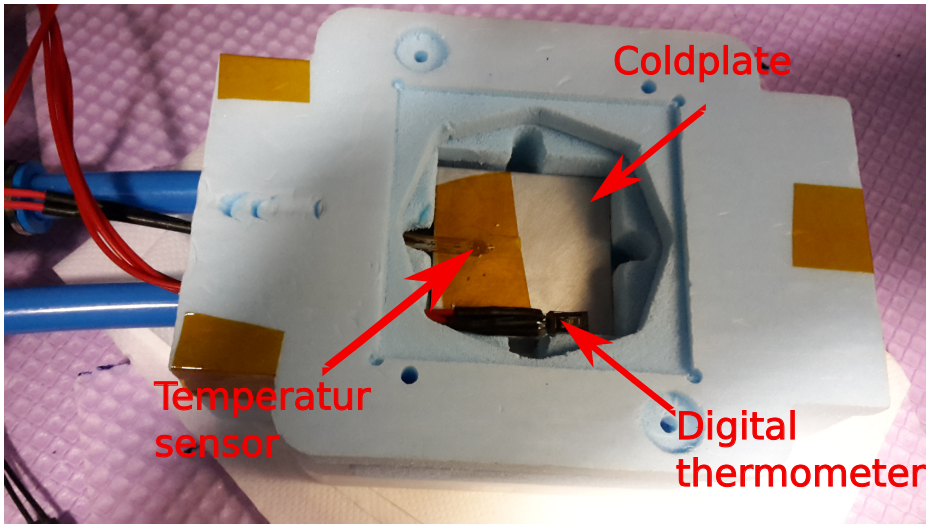
- Cooling unit designed by Magne: https://twiki.cern.ch/twiki/bin/viewauth/Atlas/ItkPixCoolingUnit
- Used inside plexiglas box with cooling setup connected with chiller

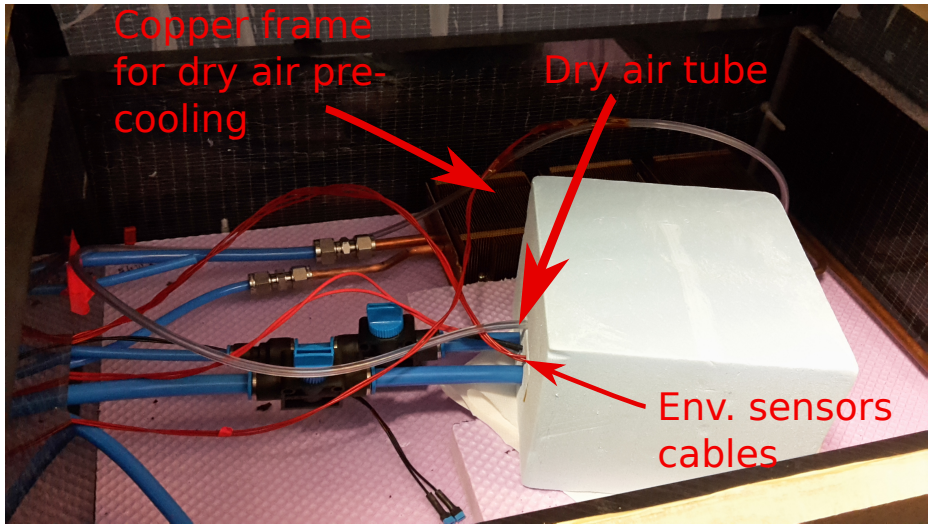






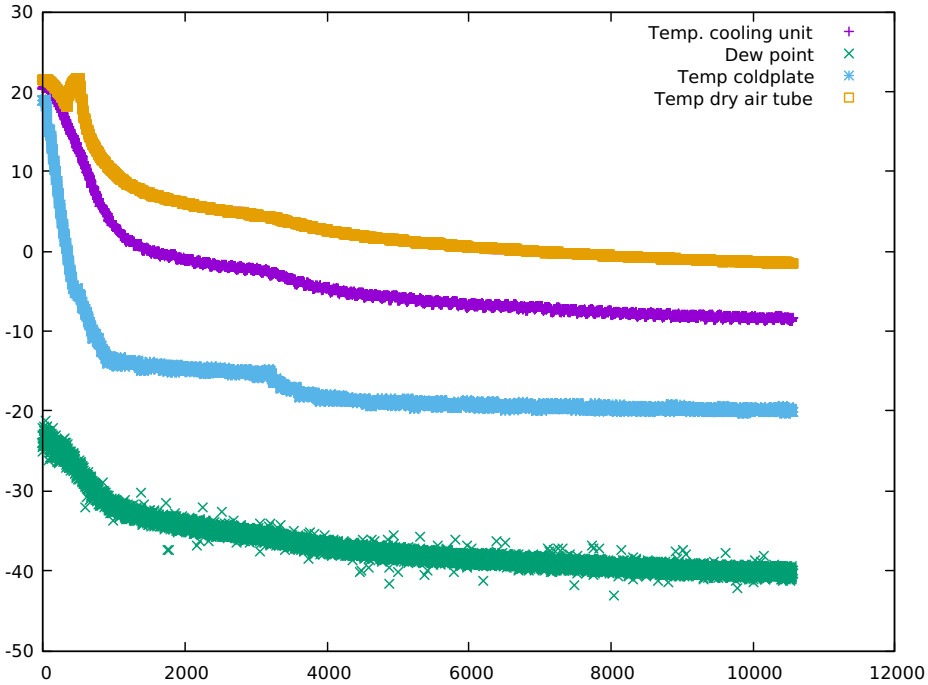
Setup





- Coldplate ordered from amazon; surface polished
- Connected to chiller with min. Temp. $-25°C$; placed in cooling unit
- Cooling unit flushed with pre-cooled dry air at 2L/min.
- Help by E. Danilevich
- Dry air with larger flow in larger box to avoid condensation on tubes
- Environement monitoring with Arduino:
  - Digital thermometer and humidity sensor inside cooling unit volume
  - Temperature sensors: 1 taped on coldplate, 1 outside cooling unit
- Cooling unit pieces taped together with kapton to isolate further
- Dry air tube taped on foam to avoid falling in box

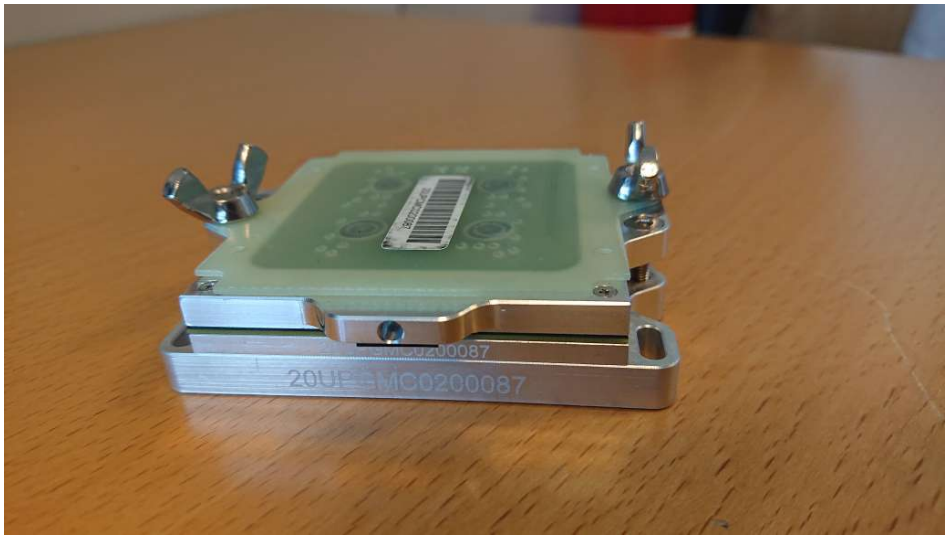
Environemental monitoring



Minimal stable temperature with correct calibration at -20°C:
Air: -8.7°C
Dew point: -40.7°C
Coldplate: -18.3°C
Dry air tube: -0.2°C

- With chiller at minimum (-25°C), achieve around -20°C on coldplate
- Reasonable dew point with 1.5 - 2 L/min. of dry air flow in unit
- No condensation observed on coldplate and tubes
- (So far) no leak at the coldplate connections
- Additional remark: lower humidity limit of our dry air unit to be checked

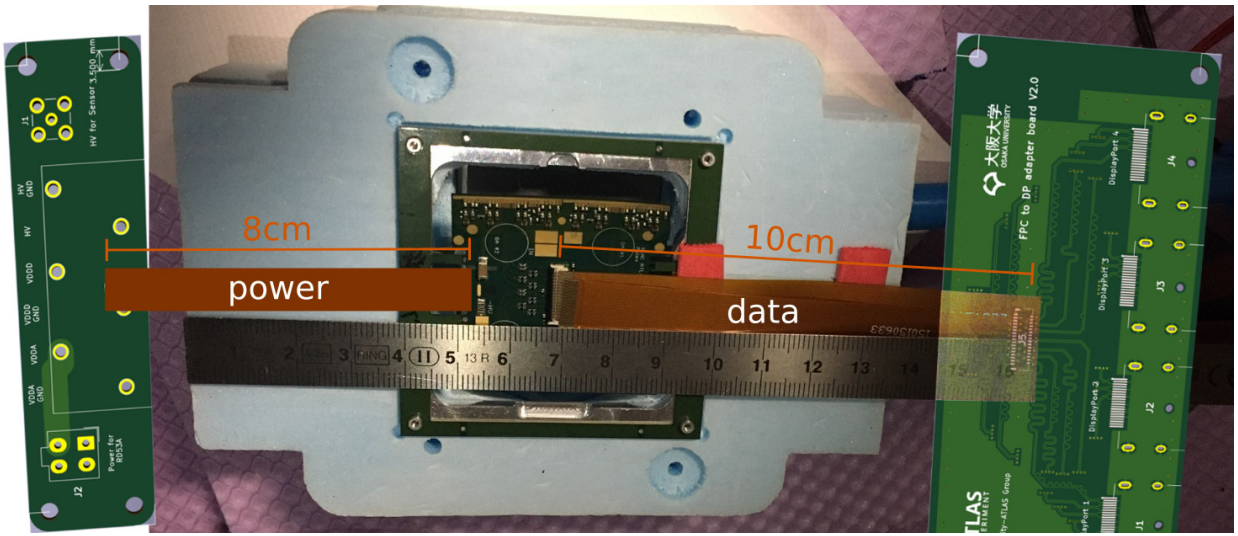
Dry air location

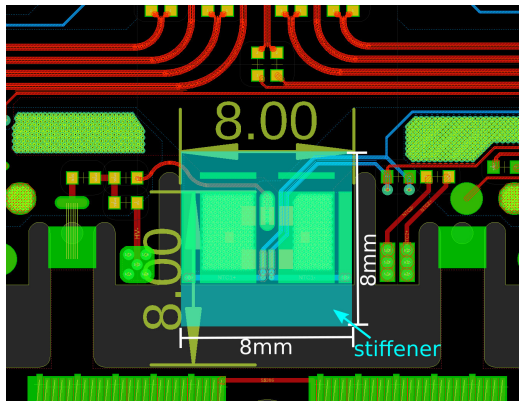


- Hole forseen for dry air flow in carrier to locate well above module
- Is safe to use without birebond encapsulation?
- Will need to replace pipe; currently diameter of 5mm

Pigtail Length

- Module symmetric in carrier, carrier symmetric in cooling unit
  → orientation of data and power pigtail interchangeable
- Molex connector on testboard sits between 16cm and 17cm → 10cm from module-Molex to testboard-Molex
- **Power pigtail** ∼2cm closer to the edge of the module PCB compared to the Molex connector
  → 8cm from BM25 to power adapter board
  → Propose to have **10cm** length for the power pigtail
- **Stiffener** for the BM25 on the power pigtail: **8mm x 8mm** with the BM25 centered
  → leave 2mm gap towards module carrier frame





Would need to build some “platform” above tubes

Next steps and open questions

Next steps:

- Tests with peltier element (arrived 2 weeks ago, but I was not here)
- Waiting for vacuum chuck; pattern seems complicated to manufacture
- Currently no further tests possible (CERN shutdown)

Open questions:

- How to operate the Peltiers (in particular 8 at the same time)
- How to get box cleanroom safe (try different types of painting)