



ATLAS Diamond Beam Monitor (Status Update)

Matevz Cerv

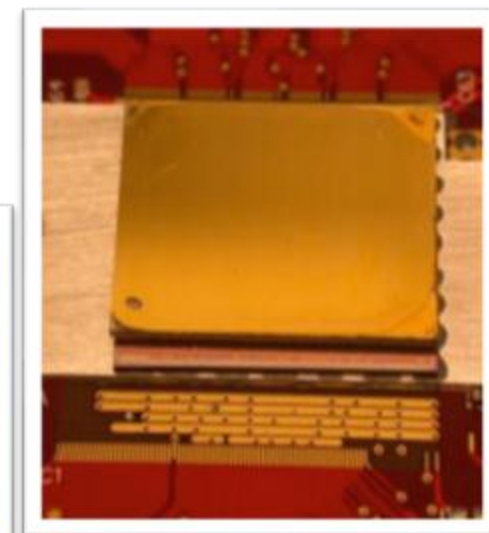
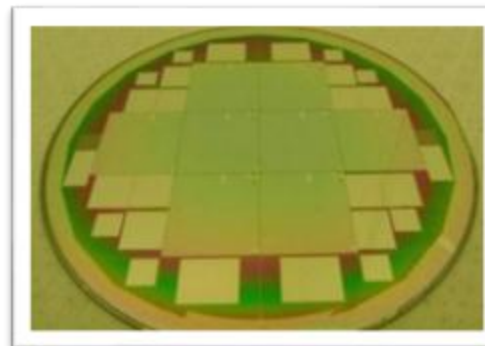
Supervisor: H. Pernegger

Content

- Position at TALENT
- DBM
- Assembly Progress Report

Position at TALENT

- Work Package 2 (sensors), ESR 3, stationed at CERN
- Sensors with high radiation hardness
- Characterization of CVD diamonds for beam monitor instrumentation (pixel, pad modules)
- Studies of irradiation damage in silicon and diamond pixel sensors
- Comparative studies for detector lifetime optimisation

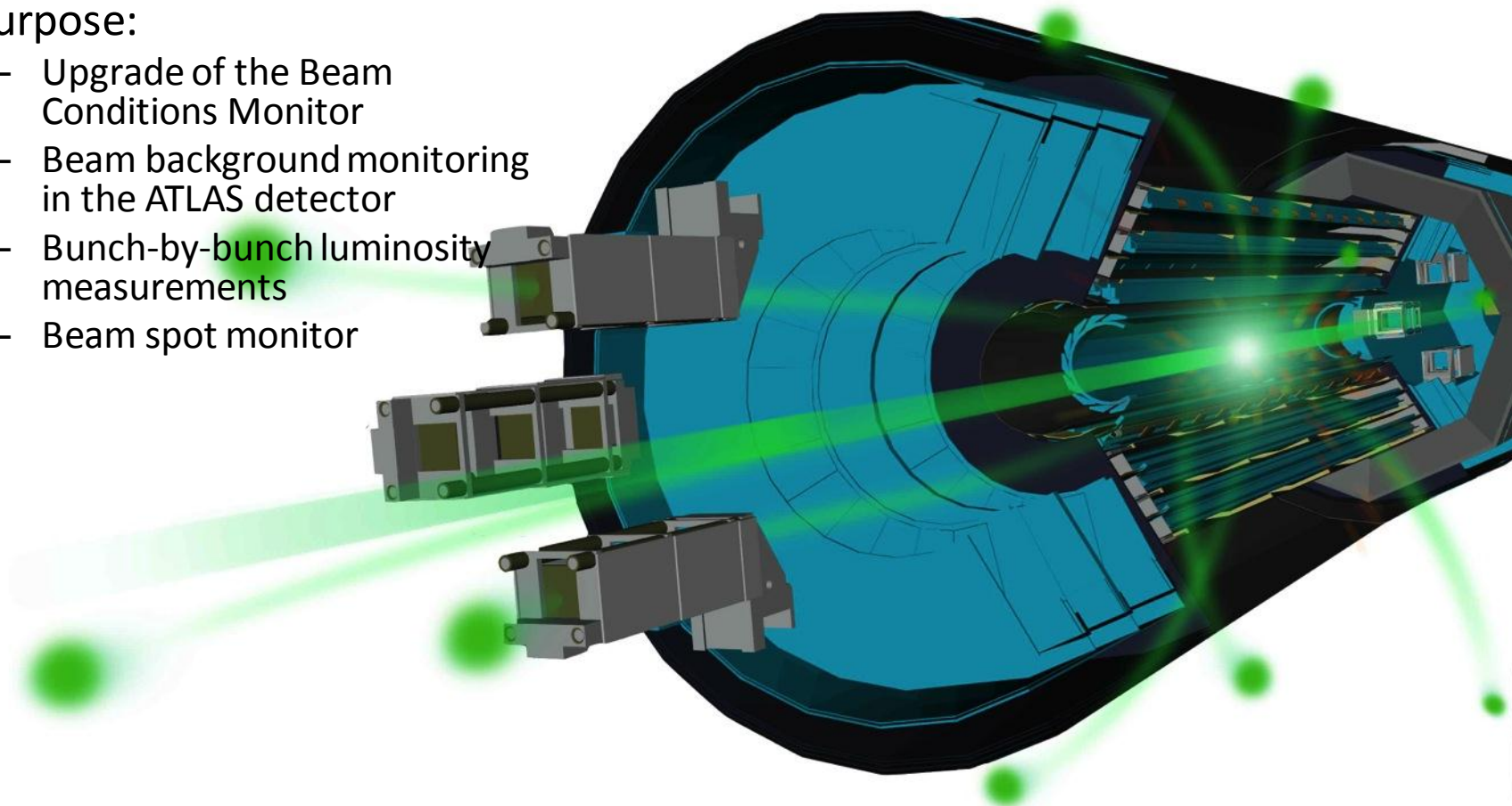




DIAMOND BEAM MONITOR

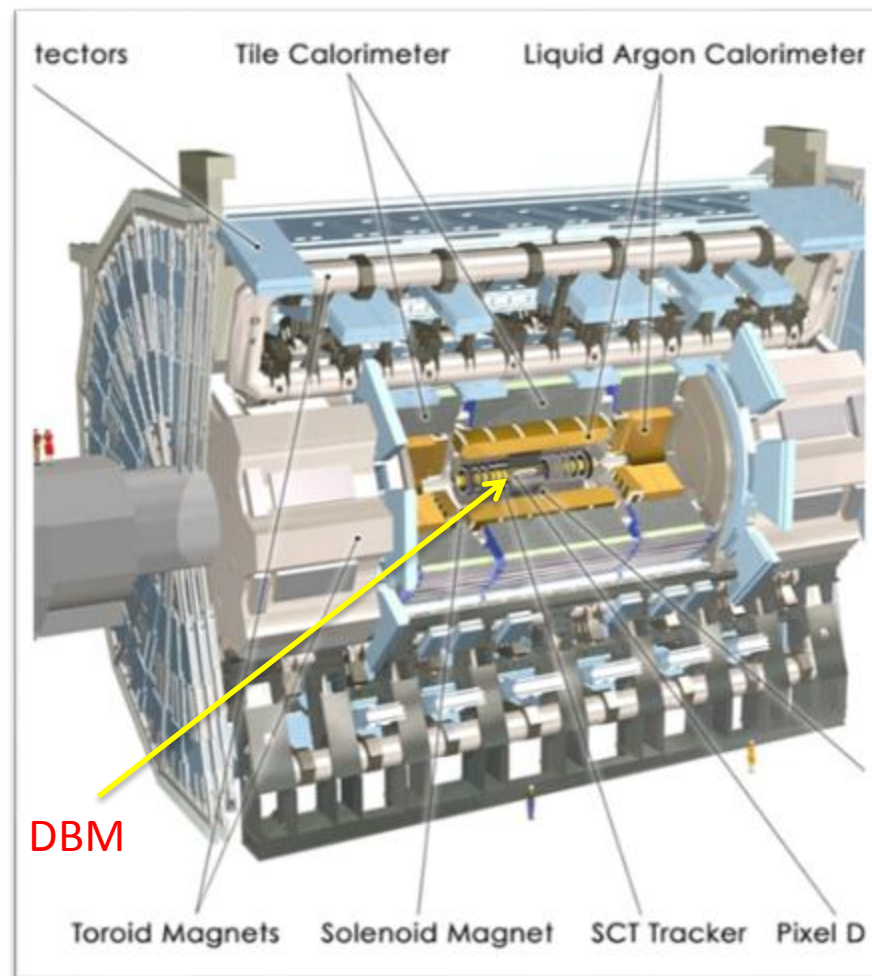
DBM

- “15th stave of IBL”
- Purpose:
 - Upgrade of the Beam Conditions Monitor
 - Beam background monitoring in the ATLAS detector
 - Bunch-by-bunch luminosity measurements
 - Beam spot monitor



DBM specs

- **Diamonds:**
 - Radiation hard
 - High sensitivity
 - Negligible noise
 - Fast signal response
- **24 x FE-14B chips**
 - ~ 27k pixels
 - 250 um x 50 um pitch
- **8 telescopes placed ~90 cm from the collision point close to the beam pipe**

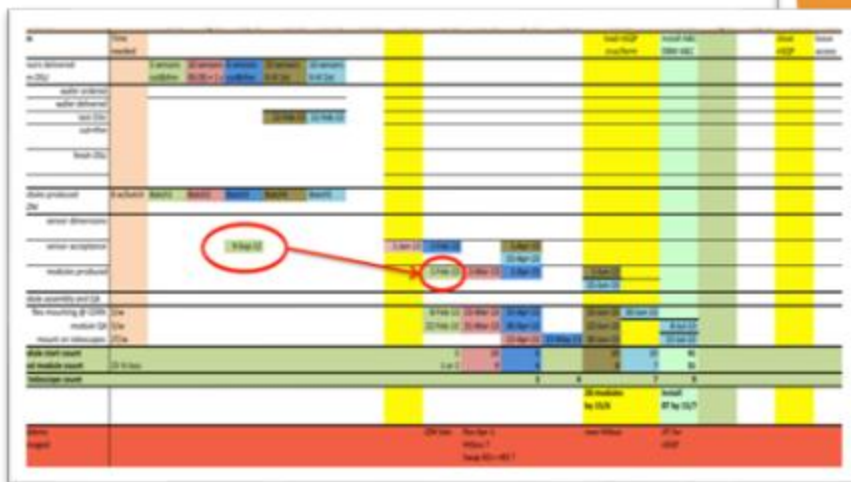
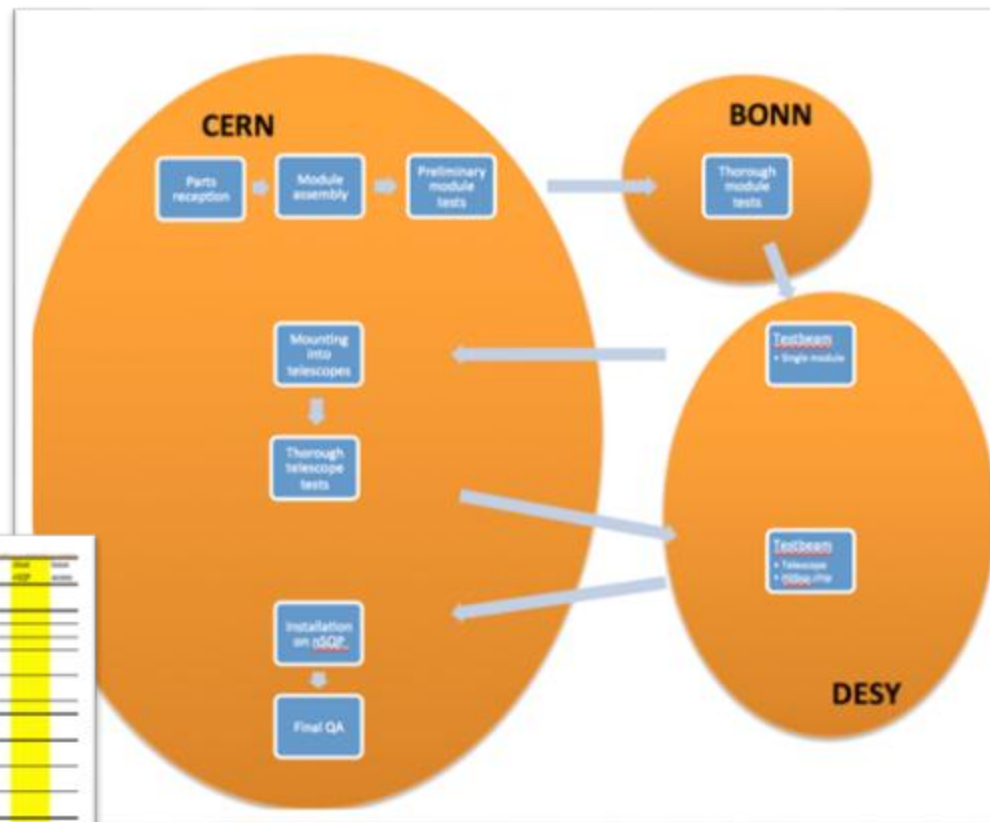




STATUS UPDATE

News, schedule

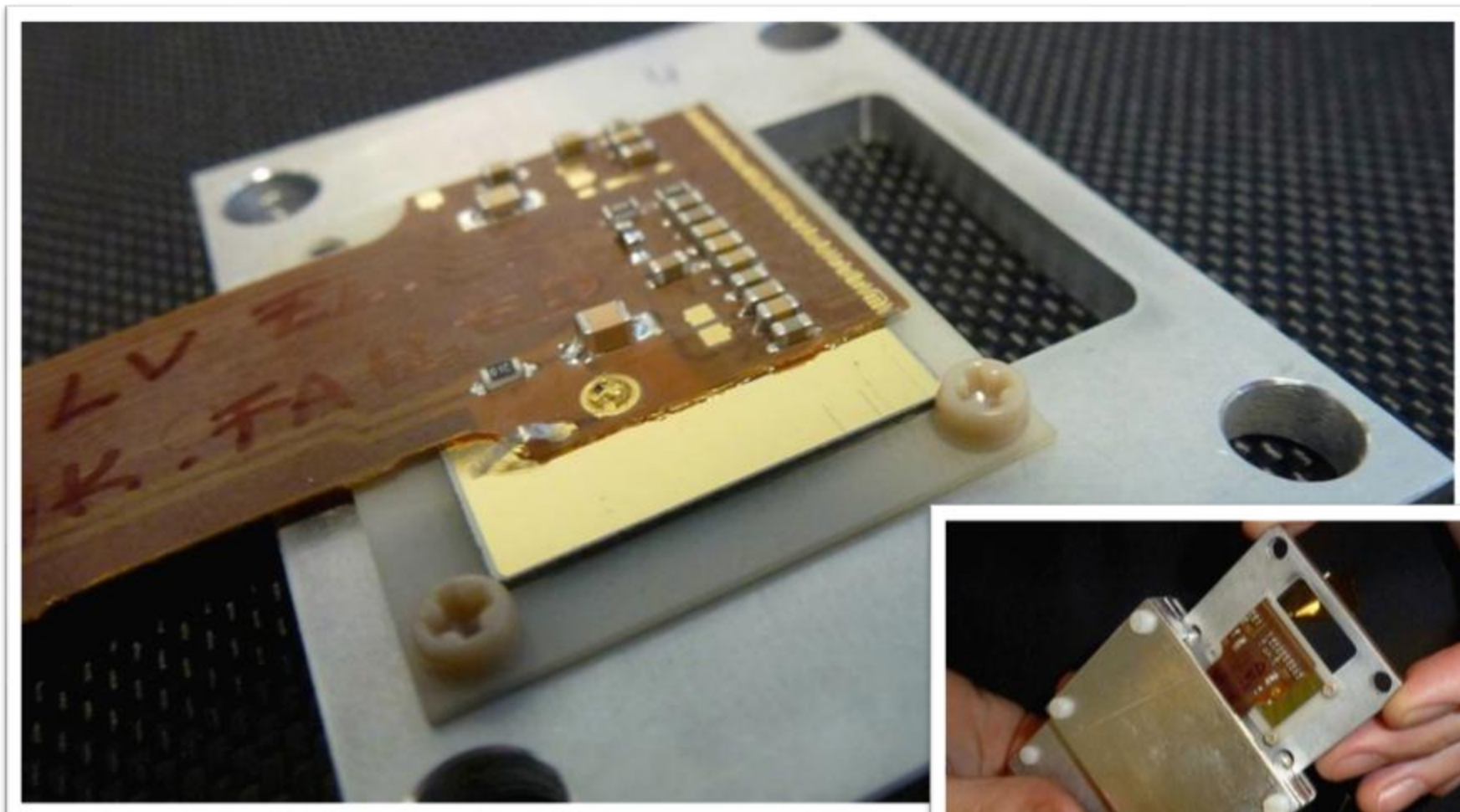
- DBM integration to ATLAS approved (July 2013)
- Tight schedule
- Receiving module parts
- Not yet receiving the diamonds ☹️
- QA procedures prepared at CERN and in Bonn





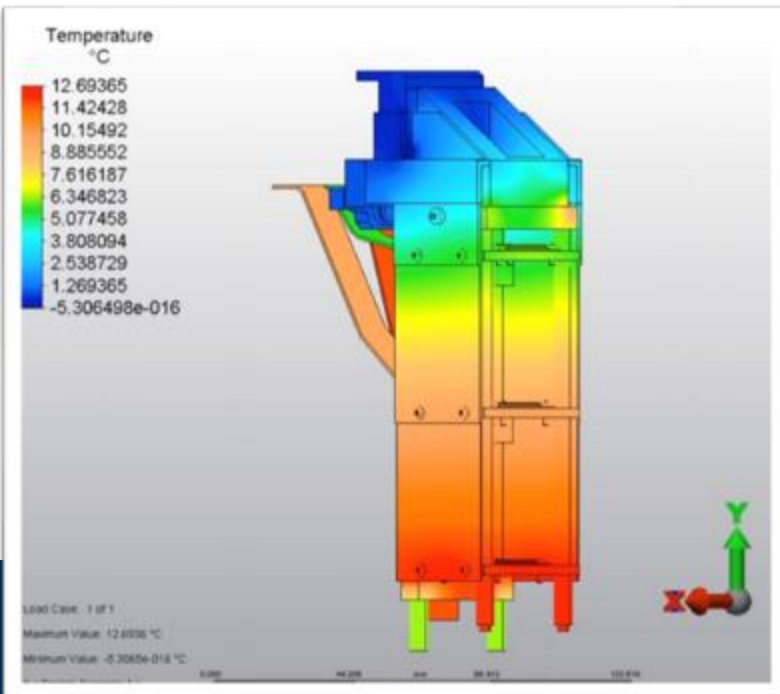
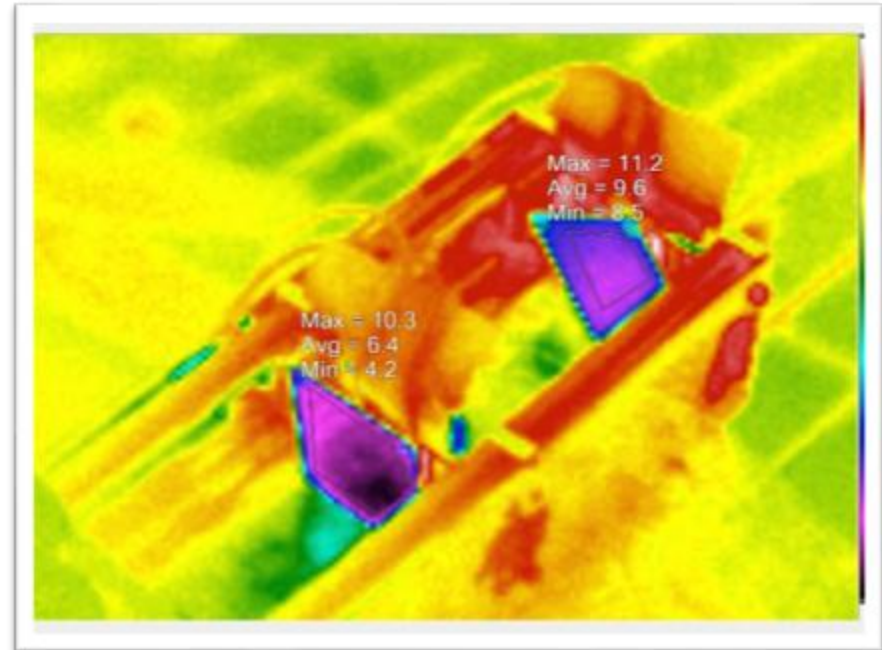
CURRENT WORK

Dummy module production

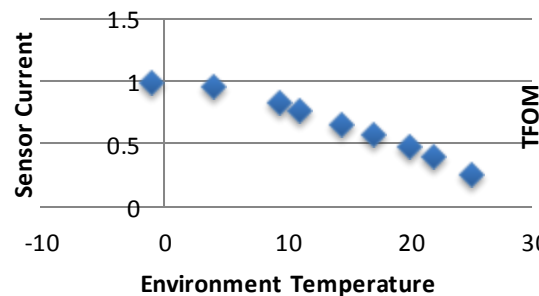


Thermal measurements

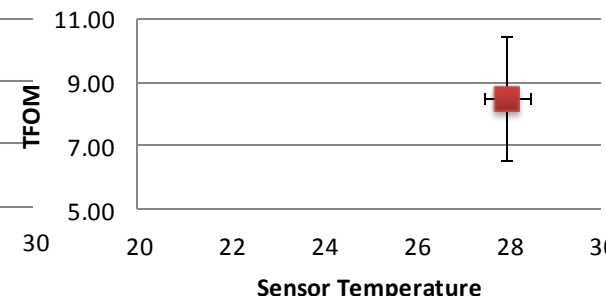
- Heat propagation/dissipation through the telescope mechanics
- Anticipated problems during pipe bake-out
- Measurements to validate the simulation results
- Thermal Figure of Merit



I_{tec} vs T_{pipes}

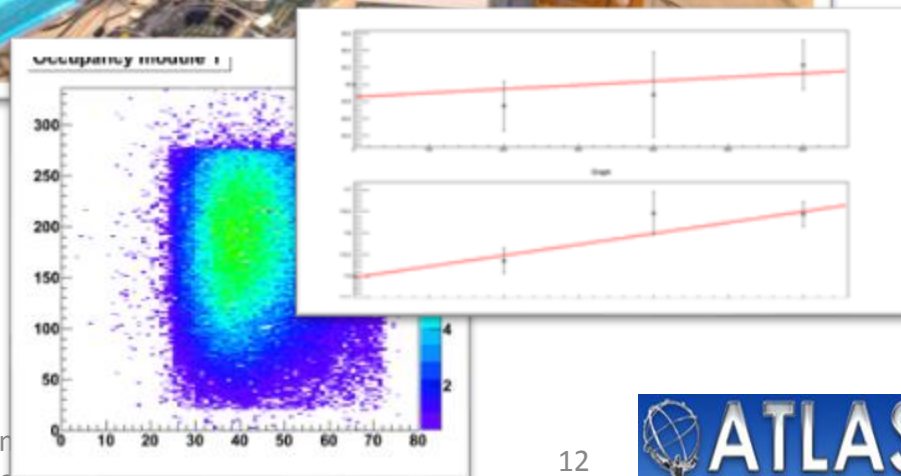
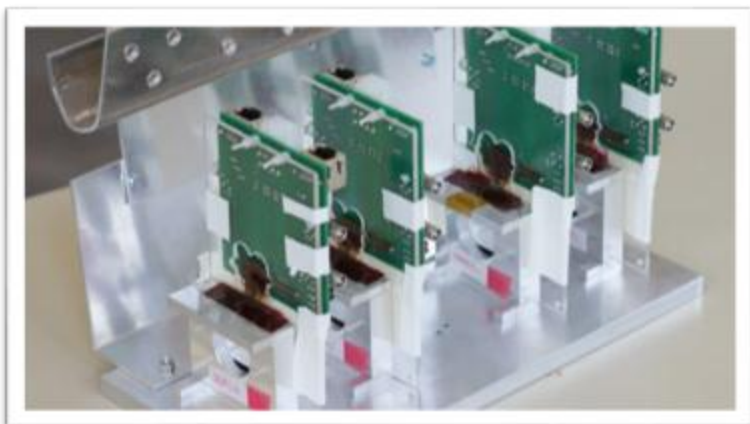
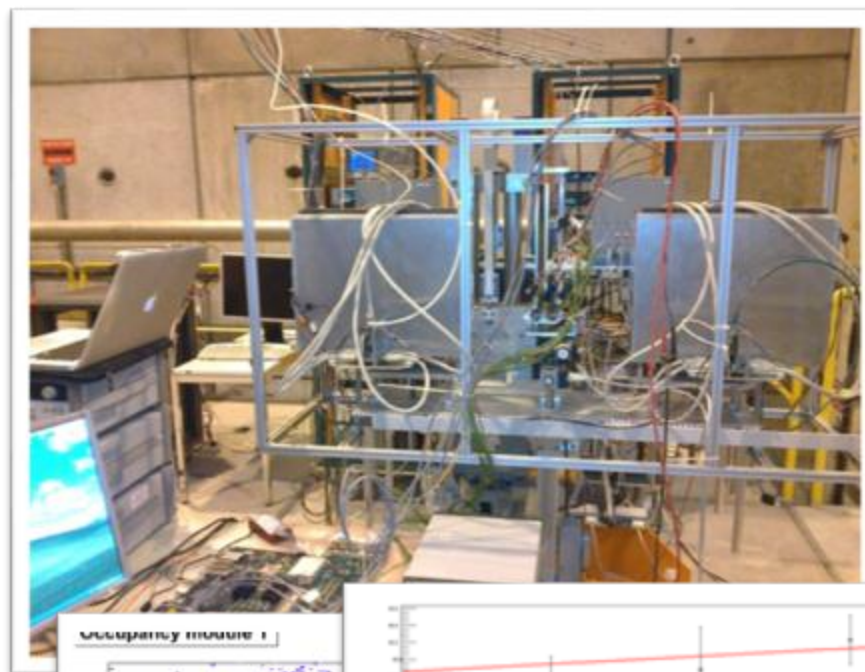


TFOM



Evaluation of the FE-I4 telescope

- Tests conducted with the particle beam in Fall 2012
- Comparison between two telescopes: Timepix and FEI4
- Analysis close to a conclusion



- Thank you

References

- DBM:
<https://indico.cern.ch/getFile.py/access?contribId=3&resId=1&materialId=slides&confId=156212>
- Diamonds: P. Bergonzo et al. CVD diamond for radiation detection devices. Diamond and Related Materials 10 (2001) 631-638.
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- WP2:
<https://indico.cern.ch/getFile.py/access?subContId=0&contribId=1&resId=1&materialId=slides&confId=190731>