Cosmic rays in the ATLAS detector

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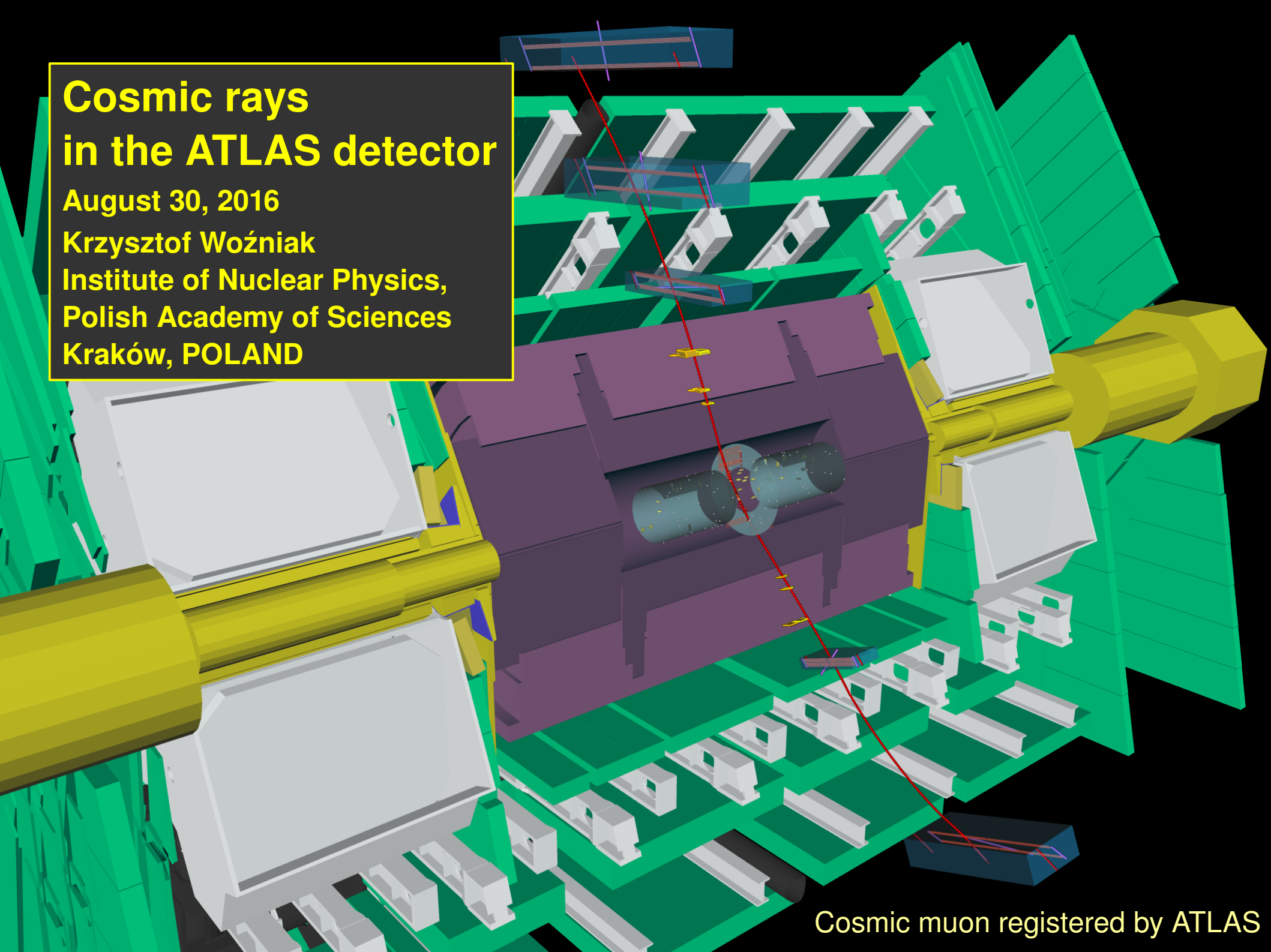
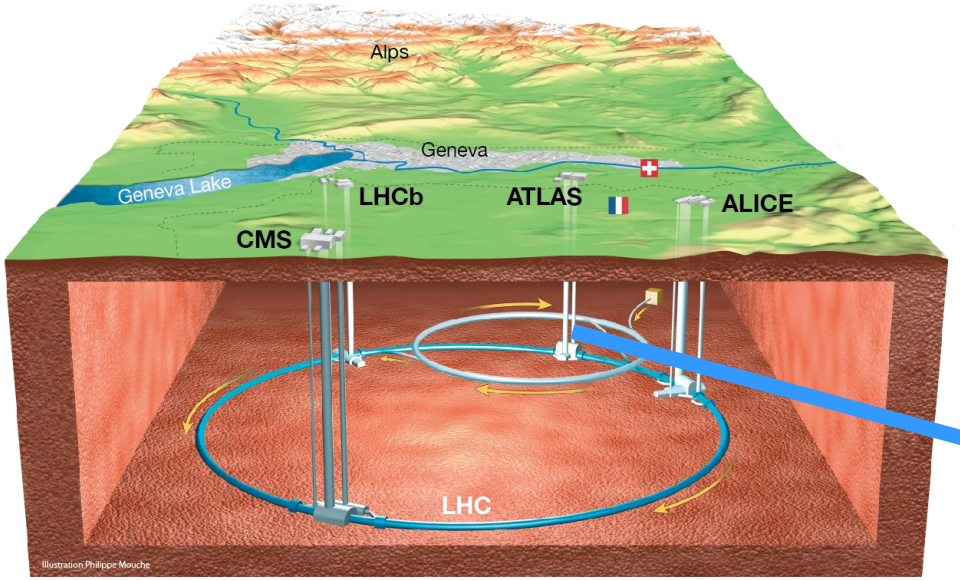


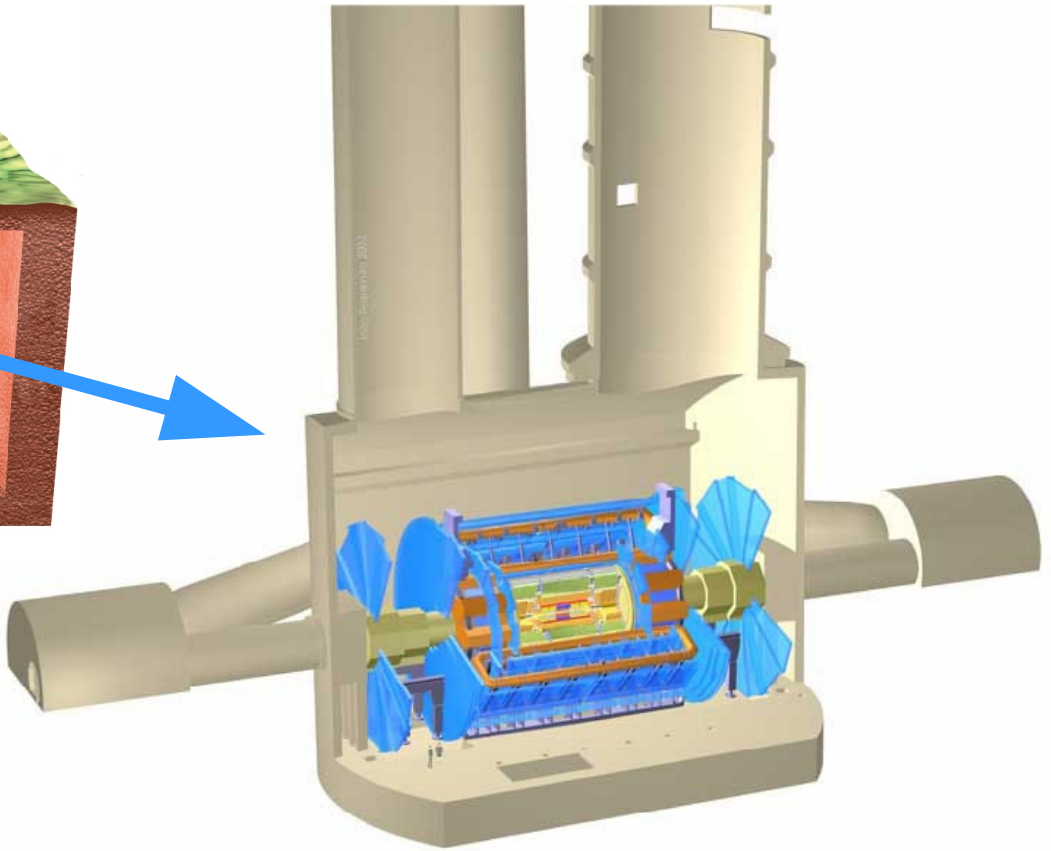
Cosmic muon registered by ATLAS

ATLAS detector

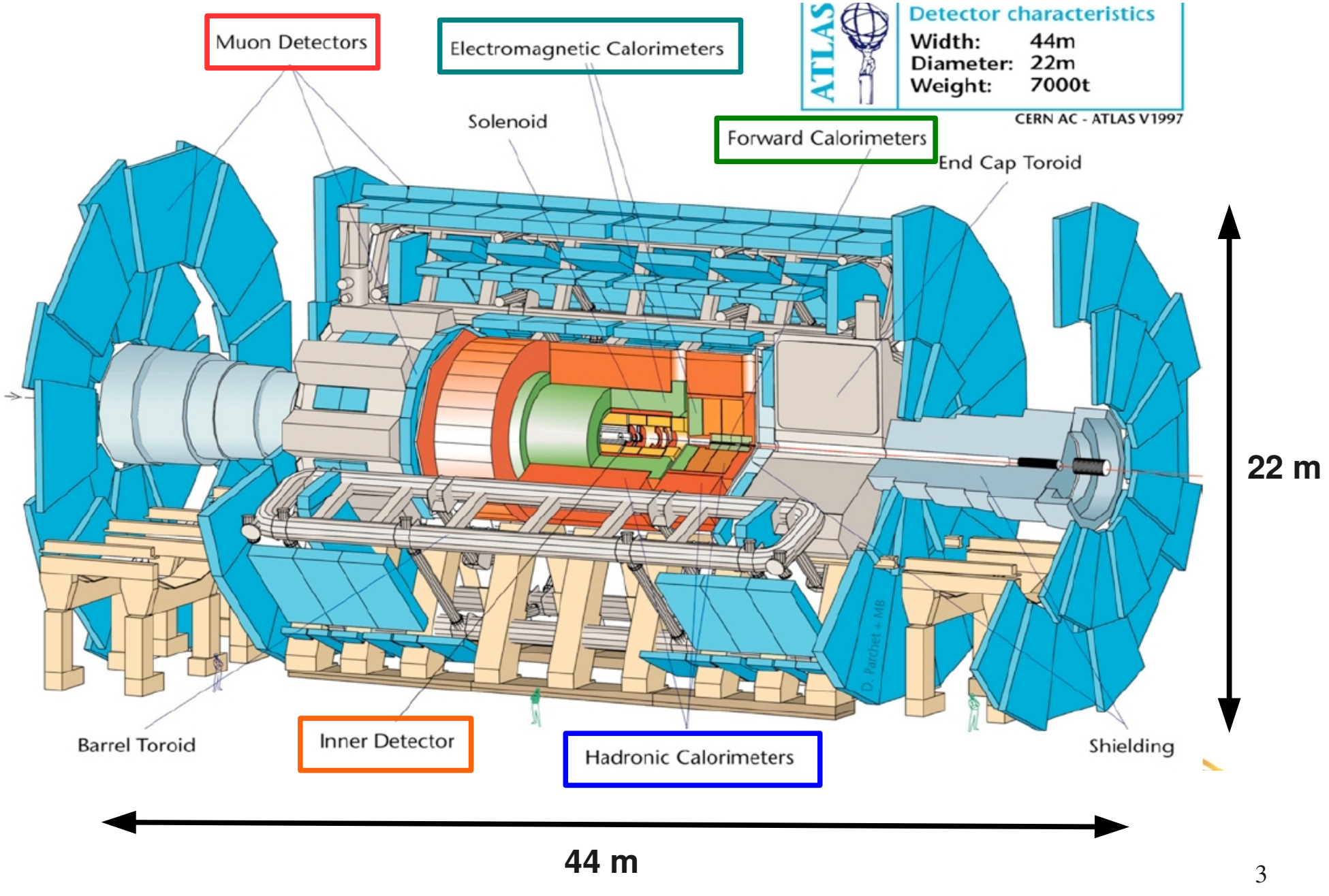
Located:

- **100 m underground**
- **material free vetical shafts (for lifts)**
- **presence of the induced radiation (time dependent)**

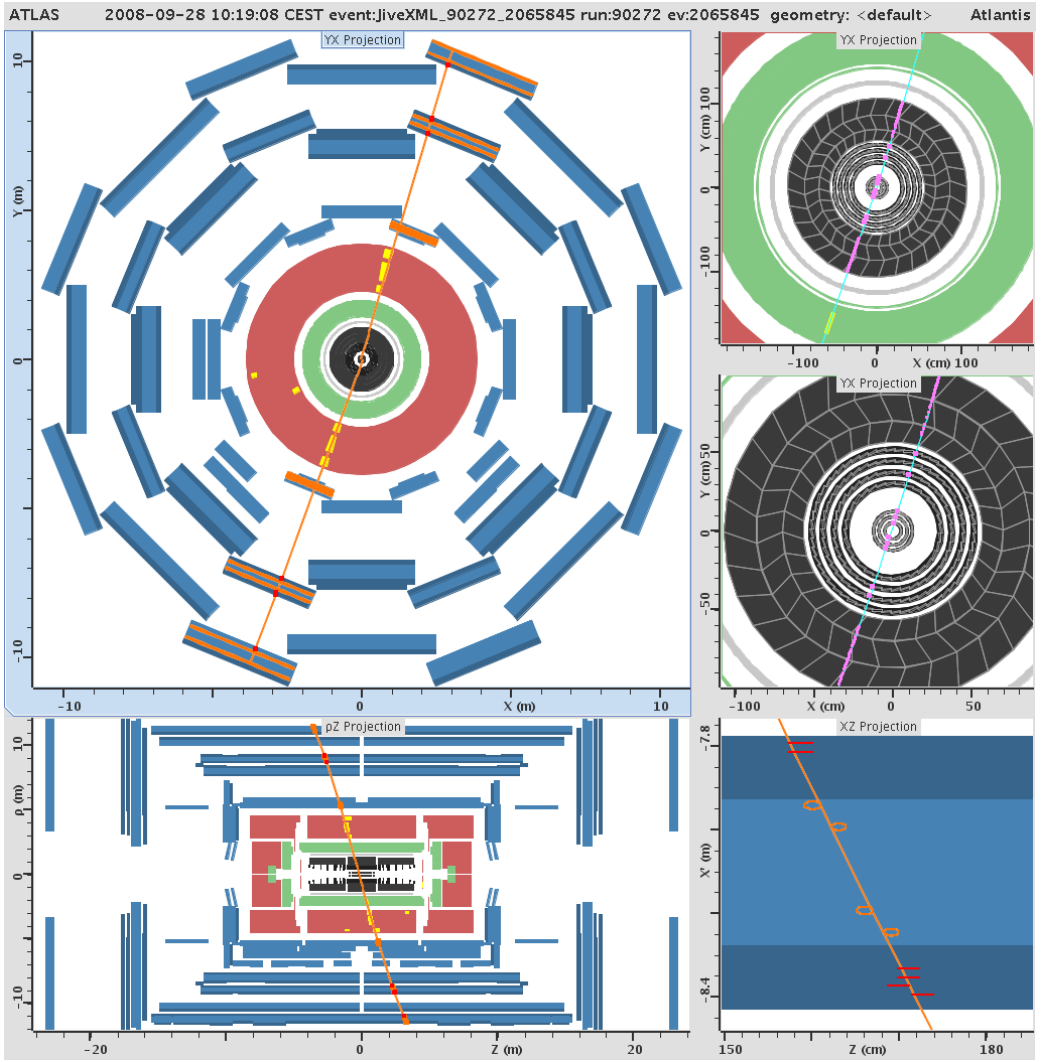




ATLAS detector



ATLAS - cosmic events

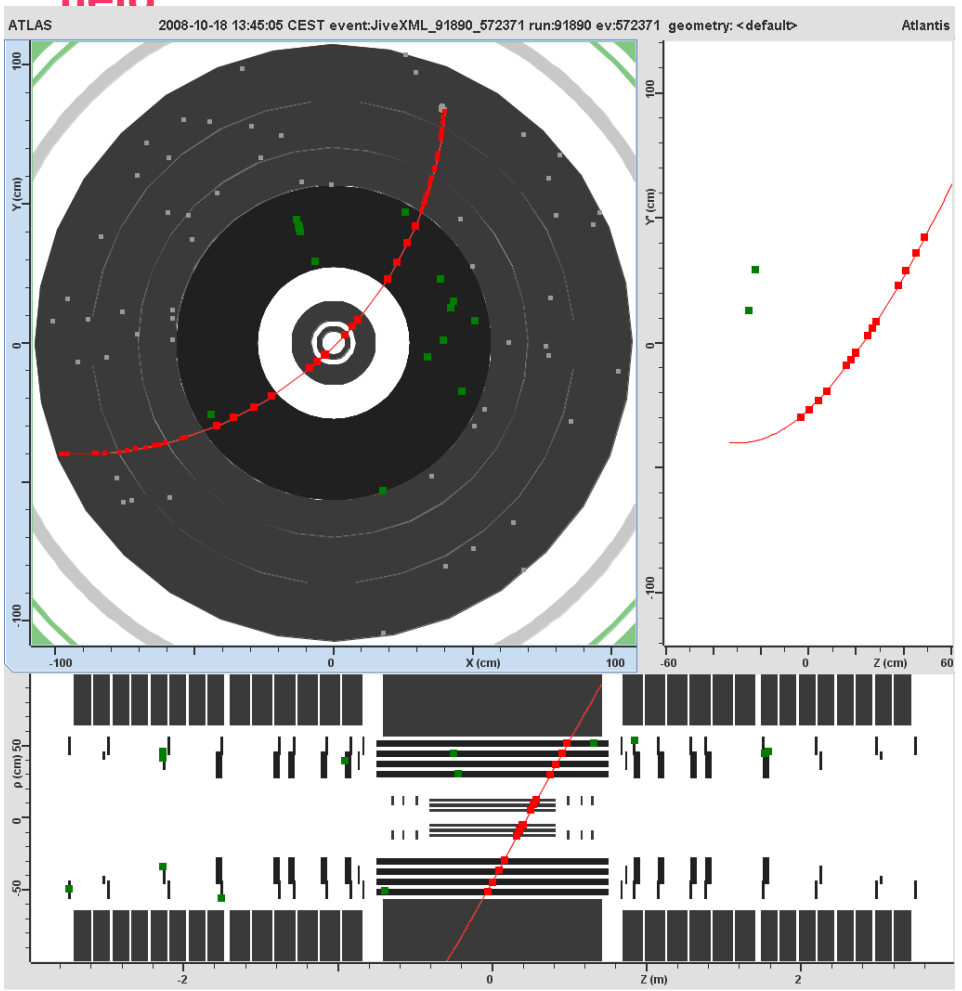


Muon track in several detectors

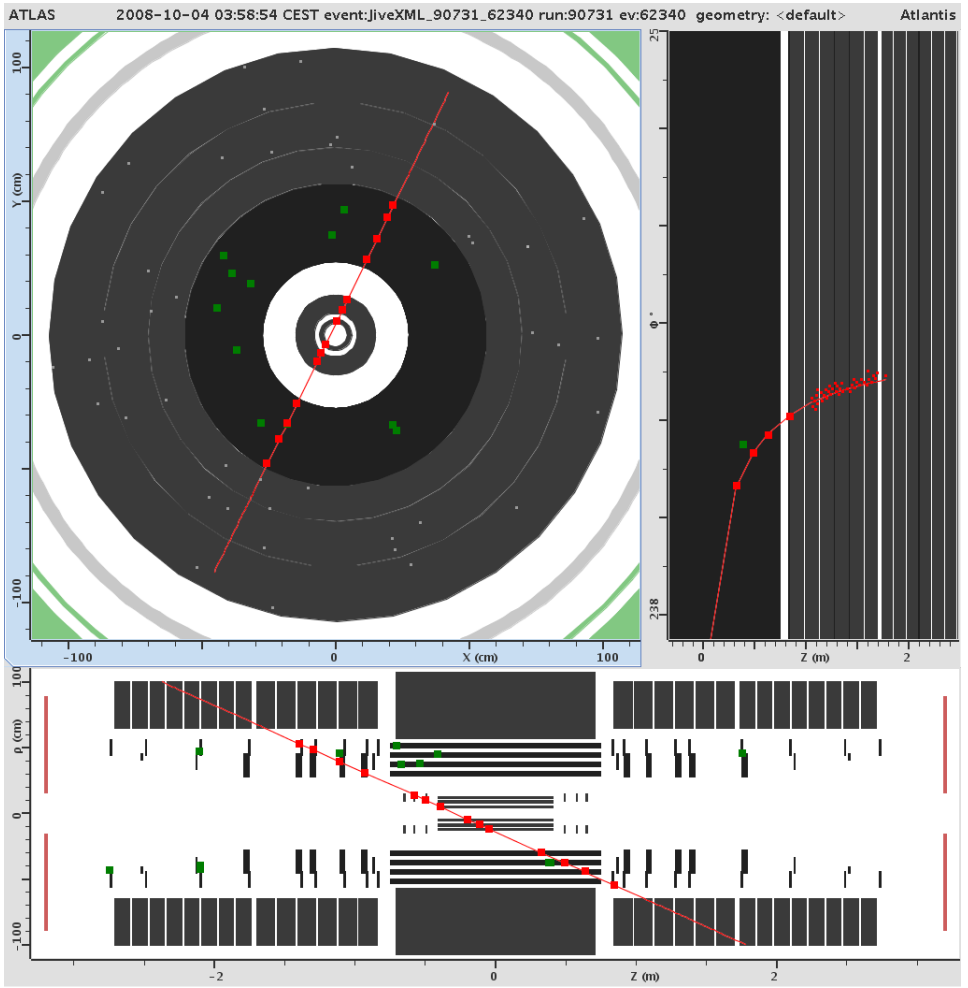
- **muon chambers (upper)**
- **inner detector**
- **muon chambers (lower_**

ATLAS - cosmic events

Muon track in magnetic field (2 Tesla) field



Muon track without magnetic



ATLAS cosmic rays measurements

Measurements of cosmic rays in "cosmic runs":

- possible only when there is no beam in the LHC (and is not planned in less than ~1 hour)
- triggers are based on signals in selected detector parts
- typical trigger rate is > 100 Hz
- muon triggers are potentially most interesting, sensotive to muon tracks with p > ~5 GeV/c
- reconstruction of muons assumes that they (rougly) originate from the collision point - one may expect much lower efficiency for muons which traverse ATLAS detector far from the center

ATLAS cosmic rays results

Publications:

- **Studies of the performance of the ATLAS detector using cosmic-ray muons, EPJC 71 (2011) 1593.**
  (arXiv:1011.6665 [physics.ins-det], http://arxiv.org/abs/1011.6665).
- **Commissioning of the ATLAS Muon Spectrometer with Cosmic Rays, Eur.Phys.J.C70:875-916,2010.**
  (arXiv:1006.4384 [physics.ins-det], http://arxiv.org/abs/1006.4384)

Cosmic rays used for calibrations and performance determination - not for studies of cosmic rays!

Cosmic data from ATLAS

Data processing and accessing:

- raw data stored to tapes
- results of reconstruction in compressed form is available
- these data need to be analysed to provide information usable for CREDO (but when the procedure is established, it may be included in the standard processing)
- as a rule, release of results, both on physics and performance, requires approval from the ATLAS Collaboration (and all collaboration members are included in the author list)
- however: some ATLAS data were already made available to everybody at the CERN Open Data Portal

Summary

ATLAS and super-preshowers:

- cosmic rays are registered by the detector
- available data needs additional analysis
- release of the data has to be approved by ATLAS