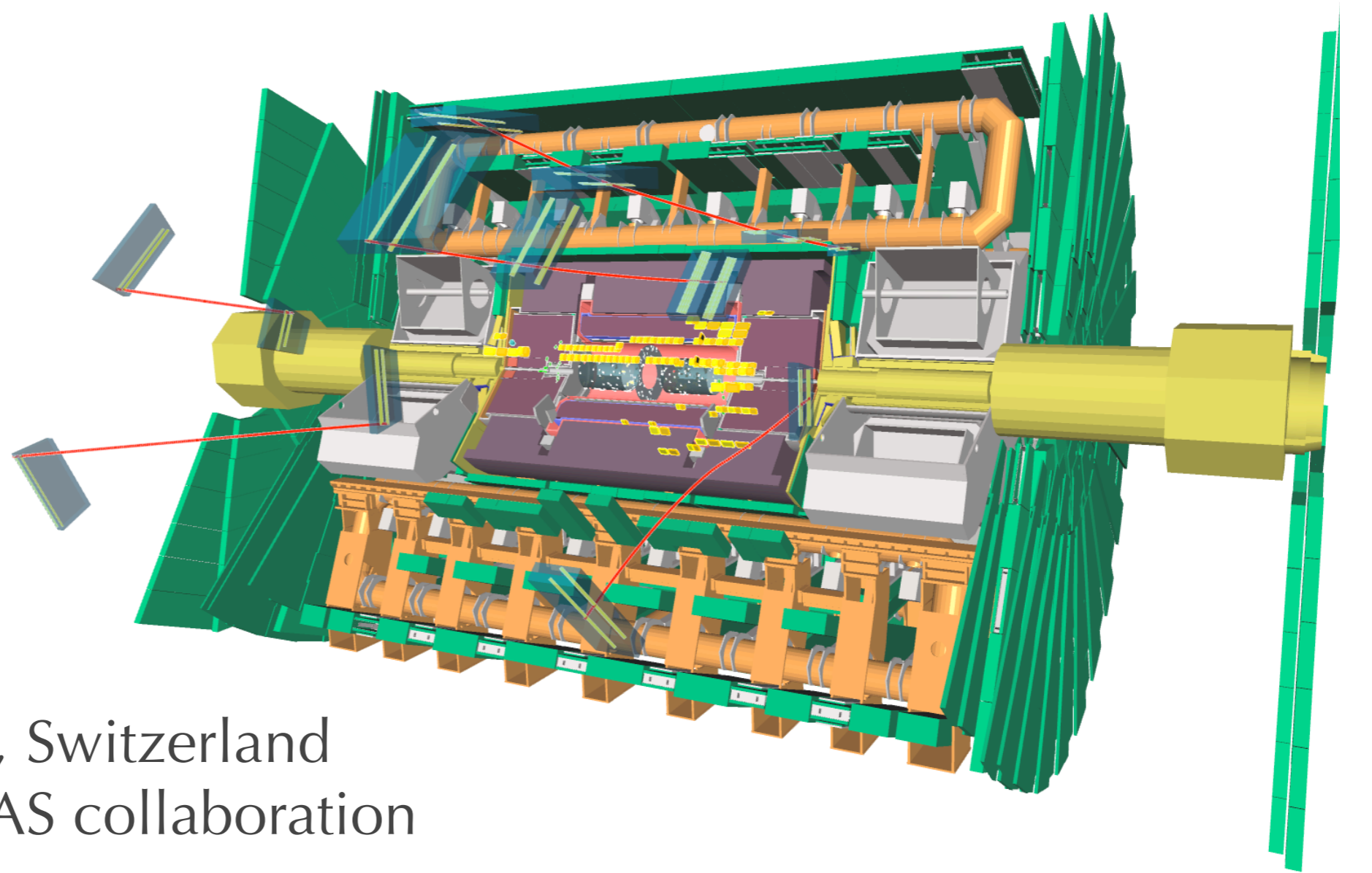# Commissioning of the ATLAS Trigger Event Selection with Single-Beam and Cosmic Rays

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Physics in Collision, Kobe 2009

Commissioning of the ATLAS Trigger Event Selection with Single-Beam and Cosmic Rays

ATLAS is one of the two general-purpose detectors at the Large Hadron Collider (LHC).

The trigger must reject a huge rate of background events and select potentially interesting ones with high efficiency.

First level using custom electronics (L1).

Event selection made by High Level Trigger (HLT), implemented in software.

Step-wise selection and fast reconstruction algorithms

Event selection based on the reconstruction of potentially interesting physical objects e.g. electrons, muons, jets, taus, and and global event properties such as missing E_T.

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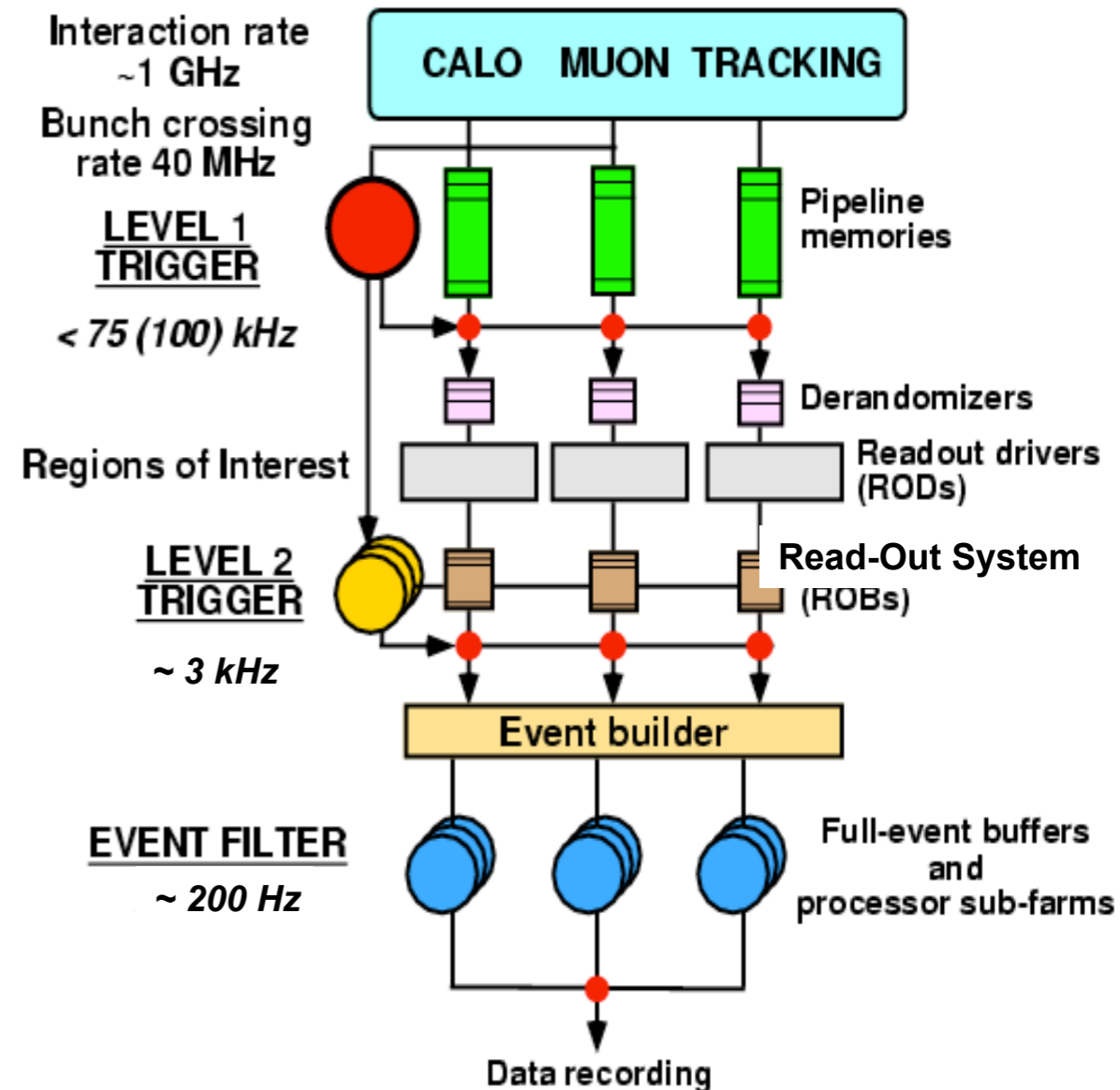
Commissioning of the ATLAS Trigger Event Selection with Single-Beam and Cosmic Rays

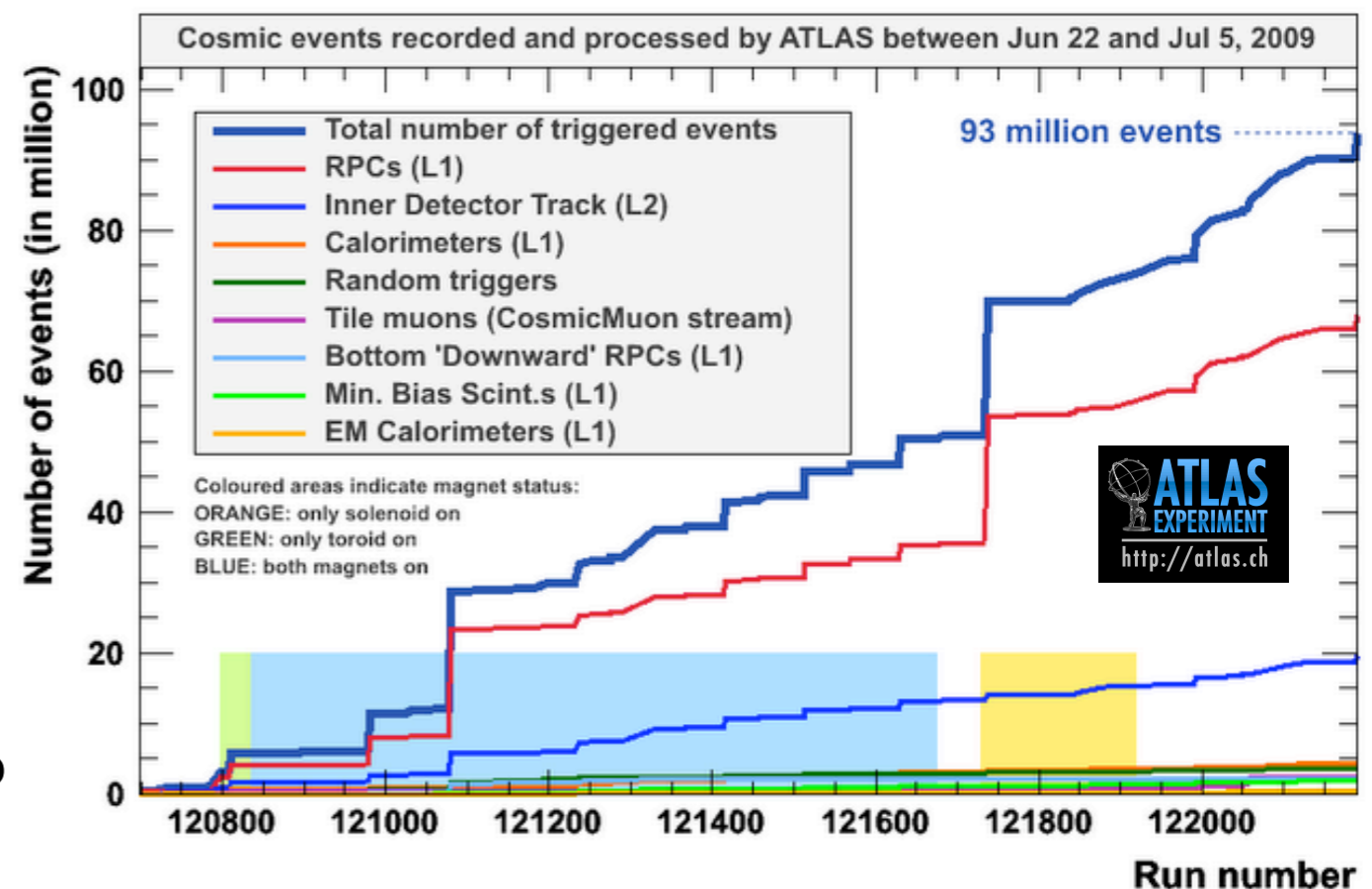The 2008 LHC startup and short single-beam run provided the first test of the trigger system with real data.

Since then ATLAS continued to collect over **300 million** cosmic-ray events for *detector alignment* and *calibration* purposes.

Provided very important data to commission the trigger algorithms.

Tracking, muon-finding, and calorimetry algorithms, constituting the first ATLAS trigger menu, exercised online.

Trigger decisions used to stream events into separate samples.

Facilitated the commissioning of the different ATLAS sub-detectors.

Cosmic events recorded and processed by ATLAS between Jun 22 and Jul 5, 2009

93 million events

Number of events (in million)

- Total number of triggered events
- RPCs (L1)
- Inner Detector Track (L2)
- Calorimeters (L1)
- Random triggers
- Tile muons (CosmicMuon stream)
- Bottom 'Downward' RPCs (L1)
- Min. Bias Scint.s (L1)
- EM Calorimeters (L1)

Coloured areas indicate magnet status:
ORANGE: only solenoid on
GREEN: only toroid on
BLUE: both magnets on

ATLAS EXPERIMENT http://atlas.ch

Run number

Commissioning of the ATLAS Trigger Event Selection with Single-Beam and Cosmic Rays

The poster focuses on the valuable experience gained in running the trigger reconstruction and event selection in the fast-changing environment of detector commissioning.

Outline

- Trigger architecture

- HLT software structure

- First experience with LHC beam

  - Timing in the triggers

- Commissioning with cosmics in 2008/2009.

  - Calorimeter triggers

  - Tracking triggers

  - Muon triggers
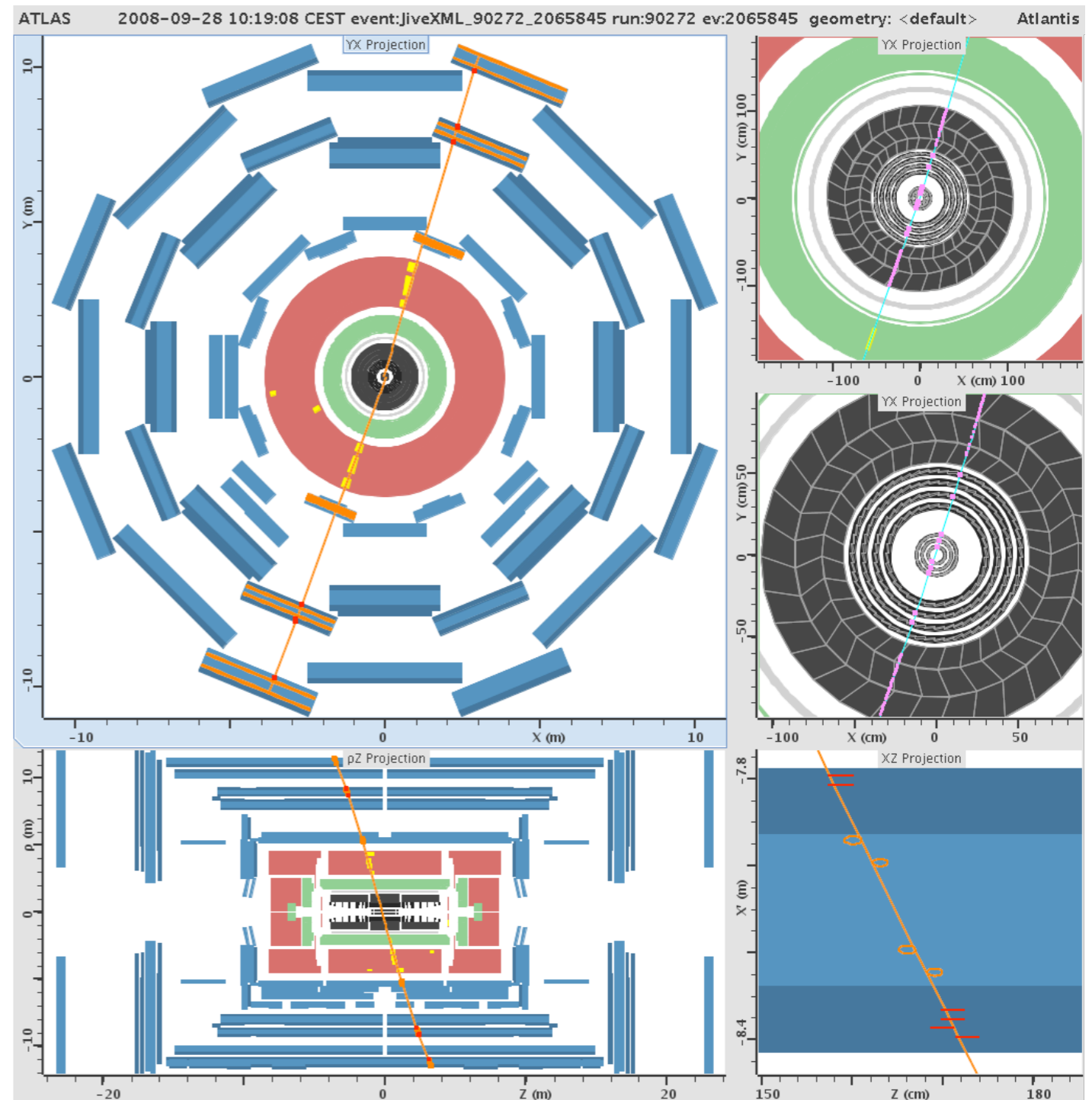
Cosmic muon traversing the inner detector

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