**ATLAS (A Toroidal LHC Apparatus)**

General purpose experiment at CERN (Geneva) for Standard Model high-precision measurements and for New Physics discoveries.

**ATLAS data taking in 2010-2012**

Thanks to the excellent LHC performance, ATLAS has collected an integrated luminosity of 7 fb⁻¹ and 8 fb⁻¹ collision data in the last three years.

<table>
<thead>
<tr>
<th>Year</th>
<th>Center of mass energy (GeV)</th>
<th>Integrated Luminosity L (fb⁻¹)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2010</td>
<td>7</td>
<td>45.8</td>
</tr>
<tr>
<td>2011</td>
<td>7</td>
<td>5.0</td>
</tr>
<tr>
<td>2012</td>
<td>8</td>
<td>3.0</td>
</tr>
</tbody>
</table>

**Software**

Coarse and fine decoding and unpacking (−5%), Intel Core i7-3930K @ 3.4 GHz.

At the end of 2010, the ATLAS collaboration reported measurements of the Higgs boson mass in 93 fb⁻¹ and 5 fb⁻¹ of 7 TeV and 8 TeV data, respectively.

**Muon Trigger System**

- Barrel: 15° (±1.5°) instrumented with Resistive Plate Chambers.
- Endcaps: 15° (±2°) instrumented with Thin Gap Chambers.

**Level 2 isolation**

After standalone and combined algorithms, further rate reduction at Level 2 is performed by applying isolation: on both calorimeter and tracking variables.

**Efficiency on real data and simulations**

Measurements with respect to offline muon reconstruction in Z → μμ events (Tag/Probe). Good agreement found for primary triggers (EF, muon, HLT in 2010; EF, muon, HLT in 2012) for both inside-out and outside-in EF algorithms. Scale factors are obtained as efficiency ratios (data/MC) vs. pT and η they are generally very close to 1 although there are some variations which need to be properly taken into account in all physics analyses with muons in the final state.

**ATLAS Trigger System**

A three-level structure implemented with sequential steps of increasing accuracy and complexity.

- Level 1:
  - Hardware based
  - Course granularity calorimeter and muon systems only
  - High-Level Trigger (HLT)

- Level 2:
  - Special fast algorithms
  - Full detector granularity in both/identified by Level 1

- Event Filter (EF):
  - Selected by Level 2
  - Access to full event
  - Full detector granularity

**Main trigger signature rates**

To evaluate a relevant fraction of the acquired data by ATLAS during the LHC run. Table refers to 2012: there is significant overlap between Run 2 and Run 3.

**High-pT muons in relevant ATLAS events since LHC start**

- 2009: collision event with two muon candidates
- 2010: Z → μμ candidate event in 7 TeV collisions
- 2012: candidate of Standard Model Higgs in 4 muons