The Liquid Argon Calorimeter

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**Calibrated LAr Timing**

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During the 2011 data taking period, ATLAS operated with an excellent efficiency, recording a preliminary integrated luminosity of 5.23 fb⁻¹ in pp collisions at √s = 7 TeV and 158 pb⁻¹ in PbPb collisions at √s_{NN} = 2.76 TeV. The ATLAS Liquid Argon calorimeter played a significant role achieving high performance and recording high-quality physics data. The aim of this poster is to present some of the main results of the past two years. The detector operation effort that will ensure efficient data taking through the 2012 data taking period is also mentioned. Improvements in the data quality system, calibration and the stability measurement of the calorimeter are presented and also the impact on the physics performance.

**LAr Data Quality inefficiency in 2011**

**LAr Timing**

Periodic studies ensure that the whole LAr Calorimeter system is uniform and aligned in time:
- After the timing adjustment implemented during the 2011 data the global timing alignment for the whole LAr calorimeter is better than 1 ns level.
- Studies using the full 2011 dataset demonstrate that a timing resolution of ~300 ps can be achieved for a large energy deposit in a cell of the EM Barrel.

**LAr Calibration stability**

The stability of the calibration constants of each channel is essential for a good calorimeter performance.

**Electron Performance**

Calibrated Z→e⁺e⁻ Mass with 2011 data

The observed di-electron invariant mass distribution follow the Z line-shape obtained from Monte Carlo where the resolution constant term was set to zero. The energy corrections applied to the electrons are within 0.5% in the barrel region (EMB), and within 1% in the endcaps (EMEC-GW and EMEC-W). The mass peak resolution has been determined by fitting the distributions with a Breit-Wigner distribution convoluted with a Crystal Ball function.

**Electron Energy Response Stability**

The excellent performance of the ATLAS LAr Calorimeter system is the result of a big collective effort from everyone in the LAr Community throughout the LHC refurbishments and improvements, continuous optimization of the Data Acquisition System, development of Online and Offline Monitoring tools and finally new method development to maximize data recovery aim to minimize the data loss and keep high the performance.

**Detector operation**

**ATLAS 2011 pp run**

**ATLAS 2011 PbPb run**

<table>
<thead>
<tr>
<th>Calorimeters</th>
<th>Calorimeters</th>
</tr>
</thead>
<tbody>
<tr>
<td>LAr EM</td>
<td>LAr EM</td>
</tr>
<tr>
<td>HAD</td>
<td>FWD</td>
</tr>
<tr>
<td>97.5</td>
<td>99.2</td>
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</tbody>
</table>

**Luminosity weighted relative detector uptime and good quality data delivery during 2011 stable beams in pp collisions at √s = 7 TeV between November 12th and December 7th (in %):**

- **PP run:**
  - EM: 99.2%
  - HAD: 100%
  - FWD: 100%

- **PbPb run:**
  - EM: 99.2%
  - HAD: 100%
  - FWD: 100%

**Two main sources of inefficiencies the Noise bursts and High voltage (HV) trips:**

- **Noise bursts:**
  - Irrecoverable data corruption
  - Recoverable at a future reprocessing

- **High voltage trips:**
  - During stable beams conditions, one HV line may trip (typically in the forward region).
  - The other side of the electrode remaining powered.

**Aiming at >98% efficiency in 2012**

**Status of the Atlas Liquid Argon Calorimeter and its Performance after two years of LHC operation**