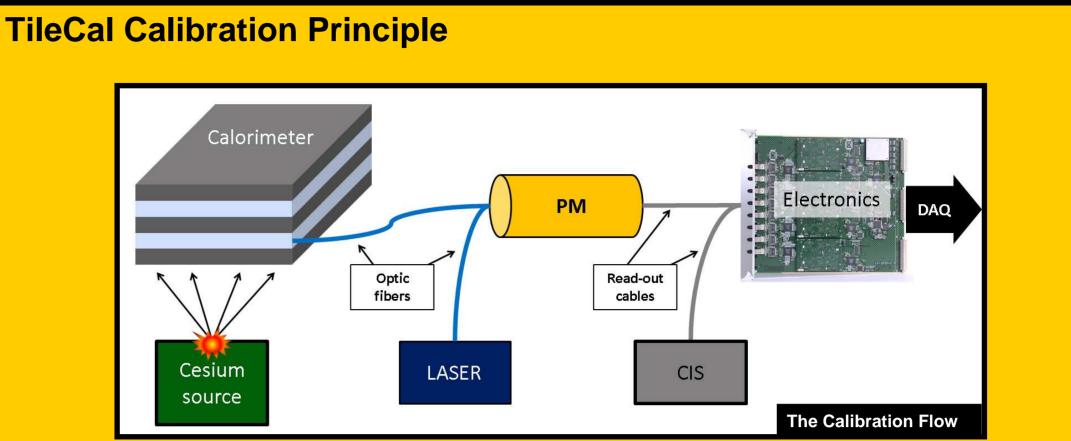


LASER Monitoring System for the **ATLAS** Tile Calorimeter

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The context

ATLAS Tile Calorimeter (TileCal) is a sampling calorimeter made of steel plates (the absorber) and scintillating plastic tiles (the active material) ATLAS TileCal is divided into **one barrel** and **two extended barrel** (end-caps) sections. All three sections have a cylindrical structure, cylinders which are azimuthally subdivided into 64 independent modules. Hadronic showers developing within each modules are inducing light in the plastic tiles. The light thus produced is transmitted via optic fibers to photomultiplier tubes (PMTs). The charge collected by each PMT is then digitized and passed to ATLAS readout system. Transition radiation track **TileCal Module** Calorimetry **ATLAS Tile Calorimeter**



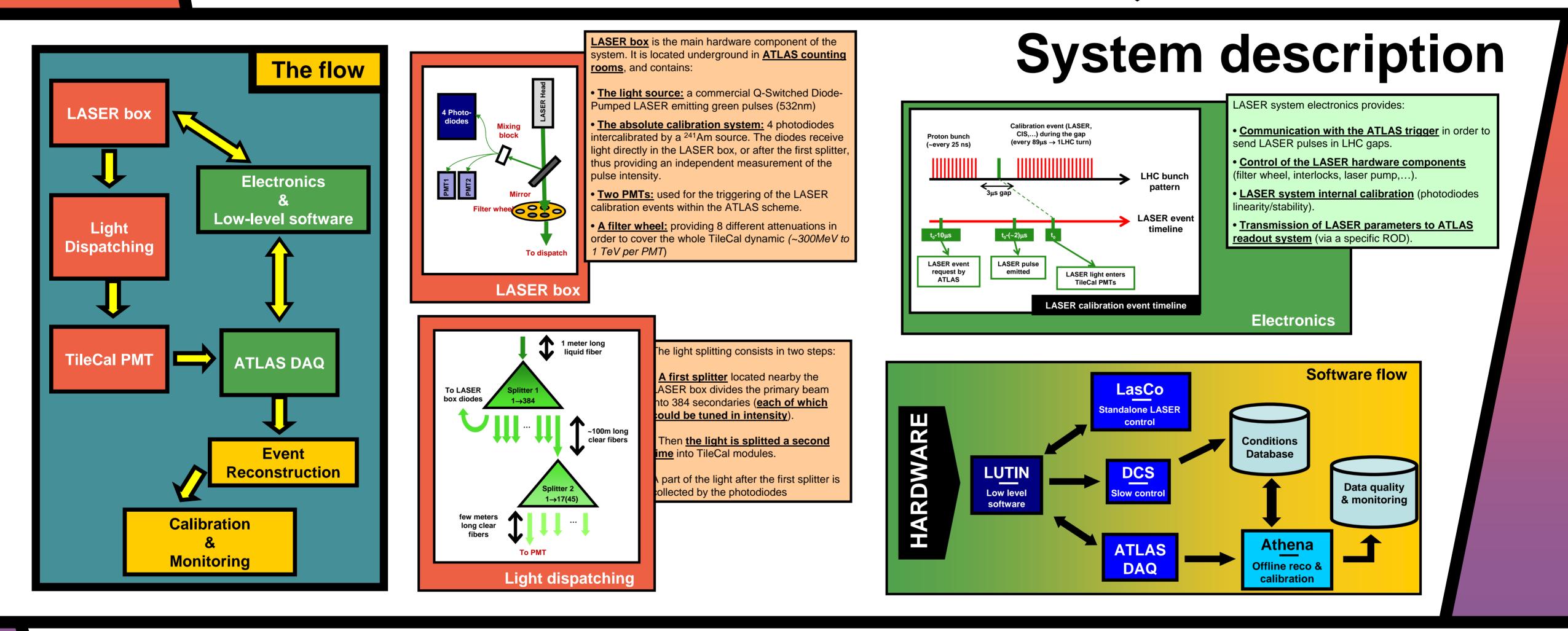
LASER system is one of the three hardware calibration system of the TileCal, which are providing a calibration of the full hardware chain, from active modules to the read-out electronic. The two other systems are:

• Cesium (Cs): a ¹³⁷Cs source is moved into the calorimeter modules. The light thus produced is collected and measured for each cell, thus leading to the comparison of each cell response. Cs system provides a calibration of the full chain.

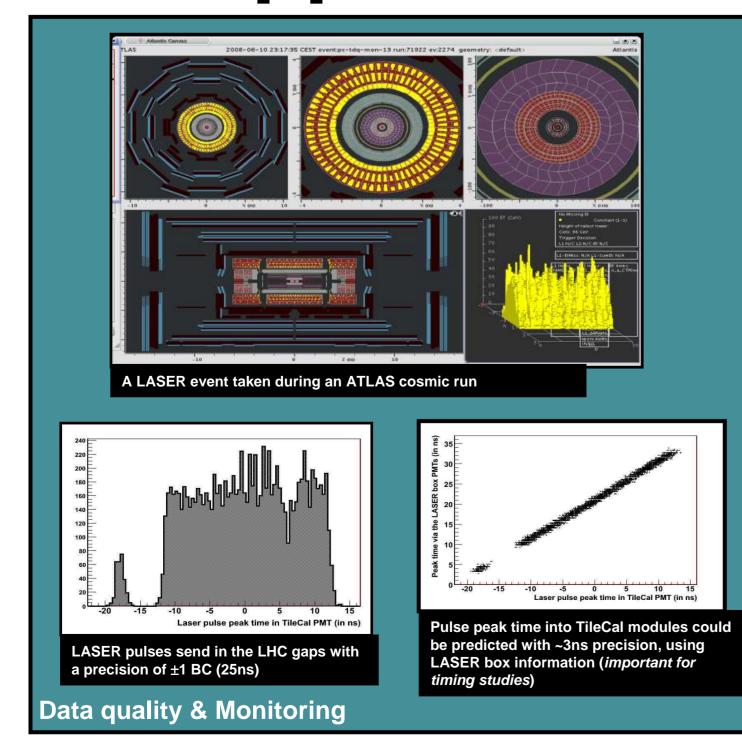
• Charge Injection System (CIS) : impulsions of known intensity are pulsed into the readout electronic chain. It leads to a precise estimation of the electronic noise and linearity. CIS calibrates the end of the chain.

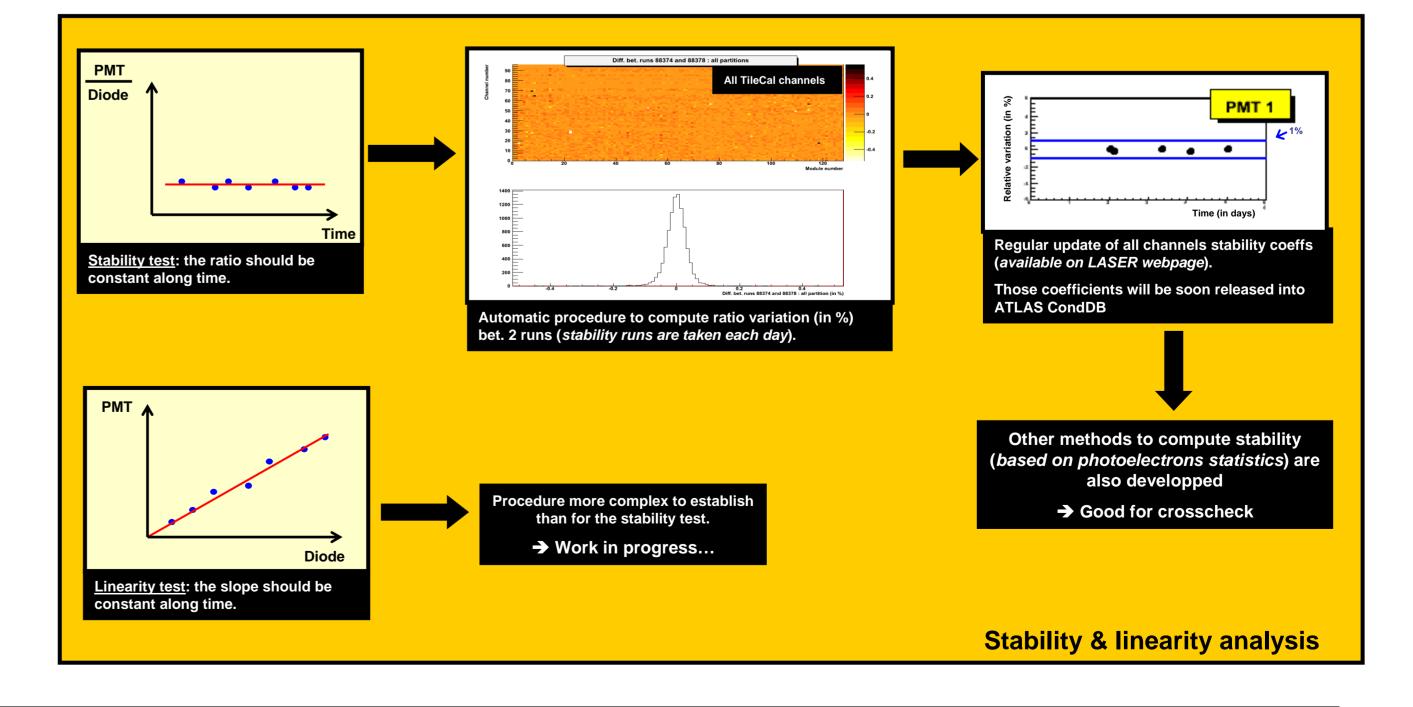
The **LASER system** provides information concerning the PMTs stability and linearity. LASER light is pulsed via optic fibers trough the PMTs. As the LASER light intensity sent is well known and calibrated, it is possible to monitor PMTs stability and linearity.

Using the three systems alltogether, it is possible to know precisely, when a problem occurs, what is the source of this problem.



Results & applications





...and many other applications...

-> In parallel to those studies, LASER system has been (and still is) extensively used for TileCal timing, Calorimeter trigger debugging,...

→ LASER system has already been a very useful tool for ATLAS commissioning...

→ More information: <u>http://atlas-tile-laser.web.cern.ch</u>

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