

# Commissioning of the CMS Hadron Forward Calorimeters Phase I Upgrade

*Monday, 2 October 2017 11:30 (20 minutes)*

The final phase of the CMS Hadron Forward Calorimeters Phase I upgrade was performed during the Extended Year End Technical Stop of 2016 –2017. In the framework of the upgrade, the PMT boxes were reworked to implement two channel readout in order to exploit the benefits of the multi-anode PMTs in background tagging and signal recovery. The front-end electronics were also upgraded to QIE10-based electronics which implement larger dynamic range and a 6-bit TDC.

Following this major upgrade, the Hadron Forward Calorimeters were commissioned for operation readiness in 2017. Here we describe the details and the components of the upgrade, and discuss the operational experience and results obtained during the upgrade and commissioning.

**Presenters:** ONEL, Yasar (The University of Iowa (US)); ONEL, Yasar (Physics and Astronomy Department)

**Session Classification:** Calibration & operation