

## Commissioning of the CMS Hadron Forward Calorimeters Phase I Upgrade

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The final phase of the CMS Hadron Forward Calorimeters Phase I upgrade is being performed during the Extended Year End Technical Stop of 2016 –2017. In the framework of the upgrade, the PMT boxes are being 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 is also being upgraded to QIE10-based electronics which will implement larger dynamic range and a 6-bit TDC to eliminate the background to have an effect on the trigger. Following this major upgrade, the Hadron Forward Calorimeters will be 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.

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