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ATLAS CIS Tech Quarterly Report

Mikel Zemborain, Elias Oakes

This report covers the activities of the CIS Techs from October 2020 – January 2021. For the month of December, most activities on CERN’s campus were paused for the winter holidays.

We have opened six drawers across each of the four partitions of Tile since the last quarterly report in October. The maintenance we performed has included replacing problematic 3in1 cards and digitizer boards, as well as a high-voltage micro card. Using the MobiDICK system and working with the data quality team, we diagnosed hardware issues to address channel noise (requiring replacement of the muon output cable), gain issues (requiring a new 3in1 card and updating gain switches) and voltage output levels. After diagnosing and addressing hardware issues, we have been responsible for testing with MobiDICK to validate maintenance and confirm the resolution of any drawer issues. We have communicated updated information regarding the status of these drawers to the data quality team by maintaining elogs of our work, updating the online maintenance status page, and delivering a comprehensive weekly maintenance report to the data quality and maintenance teams.

We have also performed two additional CIS updates using TileCal Unified Calibration Software (TUCS) macros. In the October 23 update, we updated constants for 206 ADCs, and on December 3 we updated 135. We validated the automated results by examining the variation of CIS constants with time for flagged or updated ADCs, which resulted in a number of recommended changes to flags and constant values. We expanded previous analysis procedures to include additional comparisons of high deviation and unstable channels, cross-referencing CIS constant jumps with laser calibration response over the past months. The final results of these updates were presented to the data quality and maintenance teams and uploaded to on- and offline databases to be used in physics analysis. Learning from the constructive criticism we received from the past updates, we improved on the format of our December 3 update’s presentation to better convey relevant information to the maintenance team.

In the course of these latest updates, we improved TUCS plotting procedures and addressed a number of small bugs. In December, we also identified 10 channels as candidates for maintenance based on their instability and deviation over the last year in addition to those channels identified through our normal CIS update procedures. We reported these channels to the data quality teams and discussed potential maintenance interventions for the new year. We also presented a general overview of the CIS system and our activities since arrival in October’s TileCal Week meeting.

In addition to maintenance and the DB update, we are continuing work on adjacent projects. Mikel is continuing his work training neural networks to classify signal vs background events for the VBMF+MET+photon analysis. Currently, he is learning how to apply permutation feature importance to his trained model to study how much the neural network depends on each individual feature. Elias has finished development of the Tile-in-One maintenance plugin and updated two existing plugins developed by last year’s techs. We are both planning to begin work on a new method for calculating CIS constants for the demonstrator, improving reliability and performance. Building on our experience as CIS techs, we have both applied to physics PhD programs and related positions and are looking forward to hearing back in the coming months.