Argonne NATIONAL LABORATORY

HEP Seminar

High Energy Physics Lunch Seminar

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"Construction of the phase-1 CMS pixel detector upgrade and its operation"

Host: Junqi Xie

December 18, 2018 – 12:00 p.m.-1:00p.m. Building 362/F-108

Abstract:

The innermost layers of the CMS tracker are built out of pixel detectors arranged in multiple barrel layers and forward disks in each endcap. The original CMS detector was designed for the nominal instantaneous LHC luminosity of 1 x 10^34 cm^-2 s^-1. Under the conditions achieved by the LHC with a factor two increase in the instantaneous luminosity, the CMS pixel detector would have seen a dynamic inefficiency caused by data losses due to buffer overflows. For this reason the CMS Collaboration has installed a replacement pixel detector in 2017. The Phase I upgrade of the CMS pixel detector operates at full efficiency with increased detector acceptance and additional redundancy for the tracking, while at the same time reducing the material budget. These goals are achieved using a new readout chip and modified powering and readout schemes, one additional tracking layer both in the barrel and in the disks, and new detector supports including a CO2 based evaporative cooling system, that contribute to the reduction of the material in the tracking volume. This contribution will review the design and technological choices of the Phase I detector with a focus on the challenges and difficulties encountered, as well as the lessons learned for future upgrades. Also the experiences of the first two years of operation are highlighted.

HEP Lunch seminar info:

Please use the doodle poll to sign-up for lunch at
https://doodle.com/poll/t7s8ym9ezfdvxcrb

Chicken Sandwich $8, Sub Sandwich $9, Salad $7, Slice of Pizza- $5 (all include coffee). Coffee 25¢. Pop or Water 75¢.

The HEP Lunch Seminar Schedule can be viewed at:
https://indico.fnal.gov/event/18982/