

DEPARTMENT OF PHYSICS & ASTRONOMY

Physics & Astronomy Colloquium

Dr. Grace Cummings

Fermilab

3:30 - 4:30 p.m. | Tuesday, April 8

Science Building 234

**When they go low, we go lower: expanding the
physics reach at colliders with low-level detector
information**

Even in the time of streaming and industrial big-data, the experiments at the Large Hadron Collider still produce data of staggering size and rate. To combat this, low-level detector information is often removed, reduced, or recast; however, the lowest-level detector information holds exciting phase space for both beyond the Standard Model searches and precision measurements. I will present the Compact Muon Solenoid (CMS) experiment's most recent search for heavy stable charged particles (HSCPs) in the tracker using dE/dx information. Characterized by anomalously large ionization energy loss, HSCPs are a signature driven search enabled by the inclusion of low-level information in the readout of the silicon pixels and strips. Looking toward future colliders, the Particle Physics Project Prioritization Panel (P5) recommendation of a Higgs factory demands precision detectors. To meet this challenge, we are developing high resolution homogenous crystal calorimetry through the measurement and separation of scintillation and Cherenkov light – information that currently is lost in calorimeters like those in CMS. This talk will review our first proof-of-principle measurements collecting Cherenkov and scintillation light in homogeneous crystals preparing for the precision electromagnetic calorimeter layers of the future.

Refreshments at 3 p.m. | SC 103

