



University
of Victoria

PHYSICS AND ASTRONOMY PHD RESEARCH SEMINAR (In-Person & Online)

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"Searching for Long-Lived Supersymmetric Particles Using Displaced Vertices and Missing Transverse Energy with the ATLAS Detector"

Abstract

"The Standard Model of particle physics has been extremely successful in its predictive power and has withstood a wide array of precision tests designed to expose any flaws in its description of fundamental particles. However, the Standard Model is unable to explain several phenomena observed in the universe, such as the nature of the dark matter which makes up more than 80% of the gravitationally interacting matter in the universe. In an effort to address the questions left unanswered by the Standard Model, theories that extend the Standard Model with new fundamental particles have been postulated. One prominent class of theories is Supersymmetry, which extends the Standard Model with an additional symmetry that gives every boson a fermionic counterpart and every fermion a bosonic counterpart. Many supersymmetric theories provide viable dark matter candidates in the form of a stable lightest supersymmetric particle. In order to precisely test the Standard Model and its possible extensions, the ATLAS experiment at the Large Hadron Collider has been constructed to measure high energy proton-proton collisions. In certain extensions to the Standard Model, the new particles produced in proton-proton collisions can have non-negligible lifetimes. If these long-lived particles decay to charged particles within the ATLAS Inner Detector, the tracks from the decay could be reconstructed as a displaced vertex. This seminar presents a search for displaced vertices with high invariant mass and high track multiplicity in events with significant missing transverse energy in the 2016-2018 data set collected by the ATLAS experiment. The observed number of events is consistent with the number expected from background processes. The results are interpreted in the context of a split-supersymmetry model with long-lived gluinos decaying to Standard Model quarks and neutralinos, and exclusion limits are set at 95% confidence level."

Thursday, September 5th

1:00 p.m. PST

DSB C130

Zoom link available on UVic Event Calendar