LABORATORY FOR ELEMENTARY-PARTICLE PHYSICS (LEPP)

LEPP Joint Seminar

Zhen Liu

University of Maryland

Timing BSM signals at the LHC

In this talk, I will present our recent studies exploring the physics potential of using precision timing information at the LHC in searches for long-lived particles (LLPs). In comparison with the light Standard Model particles, the decay products of massive LLPs arrive at detectors with time delay around nanosecond scale. We propose new strategies to take advantage of this time delay by using initial state radiation jets to timestamp the collision event and subsequently require at least one LLP to decay within the detector volume.

This search strategy can be effective for a broad range of models. In addition to outlining the general approach, we demonstrate its effectiveness with the projected reach for two benchmark scenarios: Higgs decaying into a pair of LLPs, and pair production of long-lived neutralinos in the gauge mediated supersymmetry breaking scenario. Our strategy increases the sensitivity to the lifetime of the LLP by two orders of magnitude or more and particularly exhibits a better behavior with a linear dependence on lifetime in the large lifetime region compared to traditional LLP searches at colliders. The timing information significantly reduces the Standard Model background and provides a powerful new dimension for LLP searches.

Friday, Oct 12, 2018
12:30pm
401 Physical Sciences Building

LEPP and CHESS resources have merged and a new lab, (CLASSE), has formed. LEPP's primary source of support is the National Science Foundation. Visit us at www.lepp.cornell.edu