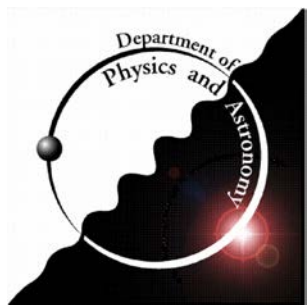




PHYSICS AND ASTRONOMY SEMINAR

Dr. Paul D. Jackson

University of Adelaide, Department of Physics

“Third Generation SUSY at the LHC and Kinematic Variables for New Physics Searches”

Abstract

Signal events where multiple missing neutral particles are present in a final state represent challenging topologies to search for new physics at the LHC. The key to any search is the ability to separate background-like events from signal-like events. Identifying such signal-like events, and extracting their properties, is exacerbated by a lack of knowledge of the particle masses and some missing kinematic handles. In this talk we will briefly summarize the state-of-the-art of searches for third generation Supersymmetry with the ATLAS experiment. Then, we present a new method to search for open final states where the decays of the two parent particles may proceed via the same, or different, channels. For final states with weakly interacting particles, a new basis of variables can be derived using the “Recursive Jigsaw” technique. We discuss the application of this procedure by considering final states containing 2 b-jets, 2 charged leptons and missing transverse momentum. We apply the ³Recursive Jigsaw² reconstruction to extract quantities sensitive to scales and angles on an event-by-event basis. The utility of this variable basis is demonstrated by studying dileptonic $t\bar{t}$ decays in comparison to various parameter choices for direct third generation scalar top quark (stop) production, where each stop decays to bottom chargino, which subsequently decay to a neutralino LSP via either on- or off-shell W decay. The applicability of the variable basis is further demonstrated using resonant $t\bar{t}$ production through a heavy graviton.

Monday, January 19, 2015

2:30 p.m.

Elliott Building

Room 060