Contribution ID: **402** Type: **Parallel contribution**

LHC Sensitivity to Wbb Production via Double Parton Scattering at 7 TeV

Friday, 12 August 2011 09:20 (20 minutes)

We investigate the potential to observe double parton scattering at the LHC in the W b bbar -> e nu b bbar process. Double parton scatterings occur when two partons inside the same hadron each undergo a high scale interaction with two partons of another hadron. The rate for this process is expected to be approximated by the product of the usual single parton distribution functions with appropriate normalization, but can be high when one process is a significant fraction of the total inelastic cross section, and non-negligible when compared to single parton interactions with the same final state. Due to the expected independence of each of the two high scale interactions, the kinematics should distinguish single parton from double parton events. Once isolated, measuring the rate of these double interactions determines the effective cross section, the normalization parameter of the independent scattering approximation. This in turn can tell us about nonperturbative models that attempt to describe and predict multi-parton interactions.

Our analysis tests the efficacy of several kinematic variables in isolating the double parton process of interest from the single parton process and other backgrounds for the first 10 fbˆ-1 of integrated luminosity at the 7 TeV Large Hadron Collider. These variables are constructed to expose the independent 2-to-2 nature of each subprocess, pp -> l nu and pp -> b bbar. Among these are S_pT', a variable which measures the momentum balance of the bb and lepton pairs; S_phi, which peaks when each pair is back-to-back in azimuthal angle; and Delta-Phi, which measures the angle between the two planes of each pair, and is expected to be uncorrelated in the double parton case. We use next-to-leading order predictions of these processes and backgrounds in our analysis to account for extra partons that may spoil simple 2-to-2 picture to test the robustness of these variables. We find that the double parton process can be "discovered" with high significance and measured at this luminosity.

Primary authors: JACKSON, Chris (University of Texas-Arlington); BERGER, Ed (Argonne National Laboratory); SHAUGHNESSY, Gabe (Argonne National Laboratory/Northwestern University); QUACKENBUSH, Seth (Argonne National Laboratory)

Presenter: QUACKENBUSH, Seth (Argonne National Laboratory)

Session Classification: Perturbative and non-Perturbative QCD

Track Classification: Perturbative and non-Perturbative QCD