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(G*) Measurement of the W Boson Drell-Yan Angular Coefficients with the ATLAS detector

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The Large Hadron Collider located at CERN outside of Geneva, Switzerland uses proton-proton collisions to produce a wide range of particles. W and Z bosons, the mediators of the fundamental weak force, are some of the particles that can be produced in proton-proton collisions and can be used to give a more complete understanding of the Standard Model. One of the ways they can decay is into detectable lepton particles, such as electrons, which can be measured with the ATLAS (A Toroidal LHC ApparatuS) detector. The Drell-Yan process is the production of W/Z bosons in proton-proton interactions with leptonic final states. Its differential cross-section expresses the probability for this process to occur depending on the W/Z bosons' and decay products'kinematic variables. It can be separated into eight spin-related ratios, known as the Drell-Yan angular coefficients. The coefficients are coupled to trigonometric polynomials which contain information about the detected leptons. Using the property that the polynomials are orthogonal to each other, it is possible to isolate each coefficient.
All eight of the coefficients for the Z boson have been measured, while only two of these coefficients for the W boson have been measured with limited precision. One reason for this difference is that there is added difficulty for the W boson case as it requires reconstructing the neutrino which goes undetected. This talk will cover my research towards measuring these coefficients for the W boson with special low pileup data sets, which aid in reconstructing the neutrino. This measurement gives both a unique result for many of the coefficients as well as it helps reduce the uncertainty for other measurements like the mass of the W boson.

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