Author: **Jacob Long**

Department: Physics and Astronomy

Faculty Sponsor: Adam Gibson-Even, Shirvel Stanislaus, Donald Koetke

Title: *Understanding Azimuthal Angular Resolutions in $p + p \rightarrow jet + X$ and $p + p \rightarrow jet + \pi + X$ at $\sqrt{s} = 500$ GeV at STAR*

Abstract:

Measurements of particle production from polarized-proton collisions at Brookhaven National Laboratory's Relativistic Heavy Ion Collider (RHIC) give insight into proton spin structure. One way that spin effects are analyzed in these collisions is through the calculation of spin-dependent asymmetries in the final-state particles. The large angular acceptance of the Solenoidal Tracker at RHIC (STAR) allows the reconstruction of full jets in addition to inclusive hadron production. Analyzing spin-dependent azimuthal asymmetries in $p + p \rightarrow jet + X$ and $p + p \rightarrow jet + \pi + X$ allows one to isolate contributions from the Sivers and Collins effects. Understanding the resolutions of the relevant azimuthal angles is critical to quantifying the systematic uncertainties of the asymmetry measurements. A useful means to study the resolutions and response of the STAR detector in light of pile-up backgrounds is to embed Monte Carlo data into real zero-bias data. In 2009 and 2011 STAR collected data from polarized-proton collisions at $\sqrt{s} = 500$ GeV. These samples include zero bias events as well as those triggered on jets, providing an opportunity to compare inclusive jets at 500 GeV reconstructed from real data to those from embedded Monte Carlo data. Progress toward understanding these comparisons and reconstructed jet angular resolutions will be shown.