USRA Project Description for Professor Deborah Harris

Neutrinos are neutral fundamental particles with a mass that has yet to be determined. Antineutrinos are their antiparticles with the same mass but opposite helicity as neutrinos. To date, very little is known about how either particles interact because they interact so rarely. The MINERvA experiment at Fermilab studies both these particles by crashing 120 GeV protons on a carbon target and focusing the positively or negatively charged particles that get produced using a magnetic horn. Most of the focused particles then decay to neutrinos or antineutrinos. One common neutrino (antineutrino) interaction that occurs will produce a negatively (positively) charged muon. This project is to measure the probabilities of neutrinos or anti-neutrinos interacting and creating muons or antimuons, as a function of that final muon or antimuon momentum. These measurements will be compared with predictions from theory.