Numerical Methods used in a Dark Matter search at the NOvA Far Detector[1] ERIC FRIES, Univ of Virginia, NOVA COLLABORATION — The NuMI Off-Axis Neutrino Appearance (NOvA) far detector will be used in a search for decay products of weakly interacting massive particles (WIMPs) as indirect evidence for the existence of dark matter. Muons passing through the detector are identified, and each muon has a set of hits associated with its track. The muon is assumed to be travelling at the speed of light from within the Earth out into space (an upward-going muon), and based off of this assumption each hit is assigned an expected time (eT). Each hit also has a measured time (mT). To identify if the track is upward-going or downward-going, mT is plotted against eT, and a likelihood ratio is calculated by comparing a linear fit with slope +1 (upward-going) versus a linear fit with slope -1 (downward-going). To keep trigger rates at a reasonable level of 10 Hz, roughly 99.99 percent of all cosmic muons must be rejected.

[1]NOvA Collaboration

Eric Fries
Univ of Virginia