Optimal Seeding of Multiprong Reconstruction of the NovA Prototype Detector[1] DONOVAN RUTH, Kutztown University of Pennsylvania, MARK MESSIER, Indiana University (Bloomington) — NOvA is a research project based at Fermilab that will search for neutrino oscillations in the NuMI muon neutrino beam. The near (at Fermilab) and far (Ash River, MN) detectors are arrays of tubes filled with liquid scintillator oriented alternatively horizontally, and vertically. When a neutrino interacts with a nucleus in the detector, the outgoing charged particles cause the liquid scintillator to ionize and emit visible light which is collected by optical fibers for detection. We can determine the magnitude of charge and position of these particles based on the intensity and pattern of the light given off from the liquid scintillator. A computer program reads the data from every tube, and attempts to reconstruct a vertex where the interaction occurred, and "prongs" or paths in which these particles have travelled by taking data of an event from the detector and seeding a vertex and one prong. Then using a fitter, finds the best fit path for some vertex and the prong, determines if this fit is "good enough" using certain scoring methods and loops through this process using one more prong each time to make a final placement of the vertex and prongs as the best fit to the event. Using simulated events, we have tested several seeding methods for the vertex of this program and determined the most accurate among them. We are currently testing a method to directionally seed these prongs, and have made several other observations of the fitter.

Donovan Ruth
Kutztown University of Pennsylvania

Date submitted: 02 Sep 2009   Electronic form version 1.4