MINERνA

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Fermilab

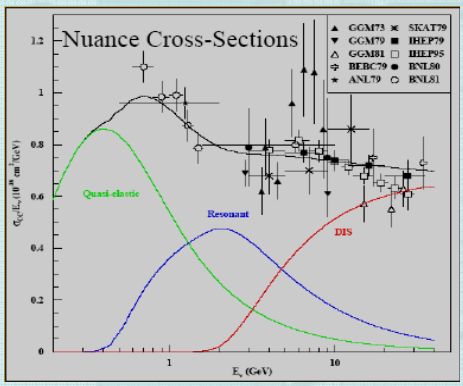
Collaboration

- University of Athens
- University of Dortmund
- University of Minnesota – Duluth
- Fermi National Accelerator Laboratory
- Hampton University
- Illinois Institute of Technology
- Institute for Nuclear Research – Moscow
- University of California – Irvine
- Thomas Jefferson National Laboratory
- James Madison University
- Northwestern University
- Pontificia Universidad Catolica del Peru
- University of Pittsburgh
- Rutgers, The State University of New Jersey
- Tufts University
- Universidad Nacional de Ingenieria – Peru
- University of Rochester
- College of William & Mary
- St. Xavier University

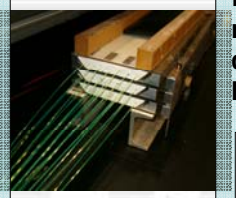
Overview

The NuMI beamline at Fermilab provides the highest-intensity neutrino beam in the world, providing an unprecedented opportunity to study many aspects of neutrino physics. The Main INjector ExpeRiment: ν-A (MINERνA) Project will conduct high-rate studies of neutrino-nucleus (ν-A) interactions, elucidating the nature both of neutrinos and of nuclear matter. MINERνA also will apply these data to support present and future neutrino oscillation experiments, in which an understanding of the cross-sections and final states for neutrino interactions is essential for precisely measuring neutrino oscillation parameters.

Physics Motivation



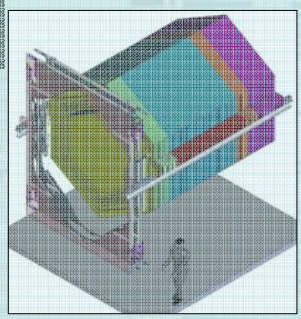
Cross sections for various neutrino interactions are poorly measured from 1 – 10 GeV. This is a significant source of systematic uncertainty for neutrino oscillation experiments seeking to measure charged-current interactions.



Vertical slice Test Stand
Co-extruded scintillator strips (TiO_2 coating) & wavelength-shifting fibers to PMT box, read out by TriP-chip front end electronics

Detector Design

The MINERνA Detector will have a fine-grained, fully active central region with both side and downstream electromagnetic and hadronic calorimeters.



Three-dimensional view of the MINERνA Detector

Targets of C, Fe and Pb are located upstream of the central region to allow the study of cross section dependence on A.

Research & Development and Project Status

- **CD-0 (Statement of Mission Need) from DOE anticipated in the very near future;**
- **CD-1 (Conceptual Design & Preliminary Cost) Director's Review in December 2005;**
- **Full module prototype to be constructed in 2006;**
- **Tracking Prototype (20% of design detector) to be built and tested in 2006-08.**

MINERνA web site: http://minerva.fnal.gov/