Abstract Submitted
for the APR16 Meeting of
The American Physical Society

Simulations of Charged-Current Supernova ν_e Events in a Liquid Argon Time Projection Chamber STEVEN GARDINER, CHRISTOPHER GRANT, EMILIJA PANTIC, ROBERT SVOBODA, Univ of California - Davis — Although it is still in its infancy, the study of supernova neutrinos has proven to be a fertile topic for fundamental science. A mere two dozen events recorded from supernova 1987A, the only supernova neutrino source observed so far, have led to numerous publications on a wide variety of topics. This bountiful scientific harvest has prompted the neutrino physics community to prepare to make more detailed observations of the neutrinos that will be produced in the next nearby supernova. Because of their unique ν_e sensitivity, liquid argon time projection chamber (LArTPC) experiments such as DUNE (Deep Underground Neutrino Experiment) have the potential to make valuable contributions to this detection effort. To better understand the expected SN ν_e signal in a LArTPC, we have developed a Monte Carlo event generator called MARLEY (Model of Argon Reaction Low-Energy Yields) for charged-current ν_e reactions on argon. By combining MARLEY with LArSoft, a LArTPC simulation package, we have obtained the most detailed predictions currently available for the response of a LArTPC to supernova ν_e. We will discuss the implications of these results for the design and operation of LArTPCs sensitive to SN neutrinos.

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Date submitted: 08 Jan 2016 Electronic form version 1.4