Abstract Submitted
for the DNP11 Meeting of
The American Physical Society

A Long, Cold, Early r-process? ν-induced Nucleosynthesis in He Shells Revisited PROJJWAL BANERJEE, School of Physics and Astronomy, University of Minnesota, Minneapolis, MN 55455, WICK HAXTON, Department of Physics, University of California, and Lawrence Berkeley National Laboratory, Berkeley, CA 94720, YONG-ZHONG QIAN, School of Physics and Astronomy, University of Minnesota, Minneapolis, MN 55455 — We reexamine a ν-driven r-process mechanism in the He shell of a core-collapse supernova with low initial metallicity. We use the hydrodynamic code KEPLER to calculate the nucleosynthesis both before and after the passage of shock, in recent pre-supernova models. We find that for an inverted neutrino mass hierarchy, $A \sim 130$ and 195 abundance peaks can be produced over $\sim$ 20–50 s for initial metallicities $\leq 10^{-3}$ the solar value. The mechanism is sensitive to the amount of ^{28}Si and ^{32}S present in the He shell in the pre-supernova model, as well as on the ν emission model and oscillations. We discuss the implications of this early r-process which could alter interpretations of abundance data from metal-poor stars.

Projjwal Banerjee
School of Physics and Astronomy,
University of Minnesota, Minneapolis, MN 55455

Date submitted: 24 Jun 2011 Electronic form version 1.4