Abstract Submitted
for the DNP20 Meeting of
The American Physical Society

Neutrino self-interaction and MSW effects in supernovae and the ν-process[1] GRANT MATHEWS, LUCA BOCCIOLI, University of Notre, HEAMIN KO, MYUNG-KI CHEOUN, EUNJA HA, Soongsil University, MOTOHIKO KUSAKABE, Beihang University, TAKEHITO HAYAKAWA, NQRST, HIROKAZU SASAKI, TOSHITAKA KAJINO, NAOJ, MASA-AKO HASHIMOTO, Kyushu University, MASAOMI ONO, RIKEN — We consider the modification of the neutrino spectrum and luminosity from core-collapse supernovae both by the neutrino self-interaction near the neutrinosphere and the Mikheyev-Smirnov-Wolfenstein effect in the outer layers. We show the effects of these interactions on the gain radius in the delayed neutrino heating of the supernova. We also consider the impact of these modification to the neutrino spectrum on the ν-process nucleosynthesis in the outer parts of the star. We find that the abundances of ^{7}Li and the heavy isotopes ^{92}Nb, ^{98}Tc and ^{138}La are reduced by a factor of ~ 2 by the ν-self-interaction. In contrast, ^{11}B is relatively insensitive. We also find that the abundance ratio of heavy to light nuclei, ^{138}La/^{11}B, is a possible new probe of the neutrino mass hierarchy, and that the normal mass hierarchy is slightly favored by solar meteoritic abundances.

[1]Work at the University of Notre Dame is supported by the U.S. Department of Energy under Nuclear Theory Grant DE-FG02-95-ER40934.

Grant Mathews
University of Notre Dame

Date submitted: 30 Jun 2020 Electronic form version 1.4