Contribution ID: **137** Type: **Oral**

Effects of neutrinos on supernova nucleosynthesis

Tuesday, 3 July 2018 10:00 (30 minutes)

A huge number of neutrinos are emitted from a neutron star at the core-collapse supernova (SN) explosion. These neutrinos interact with nucleons and nuclei, and proton and neutron abundances are affected via charged-current (CC) reactions of electron neutrinos and antineutrinos in the inner region of SNe. As a result, some of light proton-rich nuclei (p-nuclei) are produced in a proton-rich condition realized by those SN neutrino reactions. Production of 7Li and 11B occurs in an outer region of the SN, i.e., C-rich and He-rich layers. It has been suggested that neutrino oscillations in SNe significantly affect yields of 7Li and 11B in core-collapse SNe. During the propagation of neutrinos from the proto-neutron star, their flavors change. As a result, the CC neutrino reaction rates of 12C and 4He are affected. In this talk, we show updated results on the neutrino process nucleosynthesis in SNe. Neutrino spallation cross sections for 4He and 12C are corrected, and new reactions for production of 98Tc and 92Nb are included in our calculation. Initial abundances involving heavy s-nuclei are derived from a new calculation of the SN 1987A progenitor. We analyze a dependence of SN yields of 7Li and 11B on the neutrino mass hierarchy in several stellar locations. In the normal hierarchy case, the CC reaction rates of electron neutrinos are enhanced, and yields of proton-rich nuclei including 7Be and 11C are increased. In the inverted hierarchy case, the CC reaction rates of electron antineutrinos are enhanced, and yields of neutron-rich nuclei including 7Li and 11B are increased. We also find that the presupernova s-process abundances and metallicity affect the yields since the neutron abundance during SN nucleosynthesis are determined by the s-process abundances.

Primary author: Dr KUSAKABE, Motohiko (Beihang University)

Co-authors: Prof. MATHEWS, Grant (University of Notre Dame); Mr SASAKI, Hirokazu (The University of Tokyo); Prof. NOMOTO, Ken'ichi (University of Tokyo); Prof. KIM, Kyungsik (Korea Aerospace Unviersity); Prof. HASHIMOTO, Masa-aki (Kyushu University); Dr ONO, Masaomi (RIKEN); Prof. CHEOUN, Myung-Ki (Soongsil University); Prof. KAJINO, Taka (National Astronomical Observatory of Japan, The University of Tokyo); Prof. SUZUKI, Toshio (Nihon University)

Presenter: Dr KUSAKABE, Motohiko (Beihang University)

Session Classification: Plenary Session 7