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，（2014 年 2 月改定）

滞在型研究員報告書

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滞在期間	2014 年　5 月　8 日～　2014 年　5 月 23 日

１．滞在型研究員として国立天文台滞在中に行った活動について簡単にお書きください。

I've been working the α-nuclides nucleosynthesis in core-collapsed supernovae (SNe) in collaboration with Prof. T. Kajino in NAOJ, Prof. Otsuka in Univ. of Tokyo and Prof. Suzuki in Nihon Univ.. This study is to estimate significant neutrino(ν)-processes with α-nuclides in each supernovae layer. In related and consequent topics, I had discussions with Prof. Kajino in NAOJ, Prof. Kim and Dr. Kusakabe in Korea Aerospace University, and Prof. Cheoun in Soongsil University who were visiting NAOJ during my stay. In the discussions, we learned effects of neutrino oscillation in supernovae on production of Li and B. We then understood why we can estimate parameters of neutrinos from meteoritic light element abundances. In this collaboration we aim to calculate yields of light elements in supernovae with wide ranges of masses and initial metallicites. Then, I explained a strategy for the numerical calculation to collaborators.

We should mainly take into account two items in order to complete constructing a numerical code for supernova nucleosynthesis. One is import of time evolutions of radius, density, and temperature of supernova mass coordinate mesh points. The data of the time evolutions will be given by hydrodynamic calculation for explosion. The calculation is undertaken by Dr. Ko Nakamura in Waseda University, and is now under way. Another is an effect of neutrino oscillation on neutrino energy spectra. I consulted Dr. Kawagoe in University of Tokyo on a numerical treatment of the oscillation effect. We carried forward this project on supernova nucleosynthesis communicating with Dr. Nakamura and Dr. Kawagoe during this stay.

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２．今回滞在型研究員として得られた成果について簡単にお書きください。

Dr. Kusakabe and I are in construction of a numerical code for light element synthesis via supernova neutrino process. During this stay we improved the code by correcting errors and adding explanations in the code to make the code reader-friendly. In this code, a main structure for calculation of supernova nucleosynthesis has already been constructed, and 1101 nuclides and 14255 nuclear reactions and beta-decay have been taken into account. Nucleosynthesis can then be calculated by solving nuclear rate equations. The reaction rates from the latest version of JINA Reaclib database (V2.0, 2014) have been built into the code. For the moment, phenomenological simple time evolutions of density and temperature are assumed, and neutrino effects are not included. During this stay, Dr. Kusakabe also started to make routines for neutrino oscillation, and is still working on that. After the two items described in the last box in this document are addressed, we will obtain final results of supernova nucleosynthesis.

３．この制度について何か御意見がありましたら、お書きください。

I thank NAOJ for providing us the opportunity to come together with active researchers from different fields and discuss the most contemporary problems in Astronomy and Astrophysics in a stimulating atmosphere. I also found a valuable opportunity to discuss with Prof. Aoki at NAOJ and Prof. Otsuka at University of Tokyo who agreed on further collaboration with mutual visits. In my opinion, the short term visitor program of NAOJ is very effective in promoting collaboration and fruitful discussions not only in individual level but in global sense between two countries. I hope that the program is further expanded and enriched in the future.