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（2015 年 1 月改定）

滞在型研究員報告書
Activity Report for the NAOJ Visiting Fellows Program

所　　属 (Institution)	INFN-Laboratori Nazionali del Sud and Universita' di Catania
氏　　名 (Name)	CHERUBINI Silvio
研究課題名 (Research subject)	Nucleosynthesis in Supernovae and Supernova neutrinos
滞在期間 (Period of stay)	2016　年 6 月　 15 日～　 2016　 年　7　月　15　日 YYYY　 MM　 DD　　YYYY　 MM　 DD
受入責任者氏名 (NAOJ host researcher)	Prof. KAJINO Toshitaka

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。
(Summarize your activities during the stay using the NAOJ Visiting Fellows Program.)

Although this is my first visit to Prof. Kajino and NAOJ, I had many fruitful discussions with Prof. Kajino, Prof. Famiano, Prof. Matthews and many other distinguished colleagues, post docs and students. We discussed the roles of particle and nuclear physics relevant for astrophysics. In particular, we concentrated on clarifying the interplay between nuclear and particle reactions in SN environment. Our attention is focused on the possible implementation of better treatment of the neutrino-nucleus interactions at very low energy (order of magnitude tens of MeV). In this regime the relativistic Fermi gas approximation is widely unsatisfactory and details of nuclear structure effects must be introduced in numerical codes. The final goal is to construct a numerical code that allows for the reliable simulation of the response of neutrino detectors and telescopes to SN neutrino. We could start this project and obtained some preliminary result.

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。
(Summarize your research products from the stay.)

Based on our discussions of explosive nucleosynthesis and supernova neutrino physics, we prepared a international cooperation project (1) to study the capabilities of existing and future neutrino detectors and telescopes to observe low energy neutrinos originating from SN explosions and the solar activity, (2) to determine the cross sections of key nuclear processes involved in SN nucleosynthesis with a particular emphasis on neutrino induced reactions on short lived radioactive isotopes (joint paper on this part is planned to submit), (3) to model the pre-SN and explosion phase together, as the pre-SN evolution of stars pinpoints the initial conditions of the SN explosion itself. This project which we wrote together during this visit has been submitted to Italian Foreign Affairs Ministry for approval as joint research project in the field of science and technologies between Italy and Japan for the years 2017-2019 (proposal id. PGR0458).

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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。 (Please provide any comments about this program.)
As stated above, this was my first visit to Prof. Kajino and NAOJ except for many short visits and discussions during a few days in the past. I was very impressed by the effectiveness of the exchange program. I'm really indebted to Prof. Kajino for his invaluable contribution to the new research field I'm getting involved in. Indeed, his deep physics insight and encouraging behavior helped me a lot to overcome the difficulties of a tough research project to launch together with my Italian colleagues and Japanese collaborators including him. This institute NAOJ is one of the effective international centers to promote any science program in astrophysics, astronomy and nuclear physics by bringing number of colleagues from Japan and abroad based on the current program. I deeply thank NAOJ for providing me with this invaluable opportunity.