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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。（Your activity during this stay）： During my stay, we discussed several interesting physics topics with Prof. Kajino and Prof. Balantekin from Univ. of Wisconsin who was also visiting NAOJ. The most important ones are as follows:

(1) We discussed the phenomenon of spectral splits observed in some numerical simulations of the flavor oscillations of a dense neutrino gas though the neutrino self refraction mechanism which is believed to be effective in type IIA supernovae and in the Early Universe. We were able to explain the emergence of spectral splits in a formal way starting from the mean field effective Hamiltonian. In addition, we derived the most general mean field consistency equations for the stationary states of the system which lead to MSW-like flavor transformations under quasi-static flavor evolution scenarios.

(2) We also discussed the neutrino-antineutrino asymmetry transfer between different flavors though neutrino oscillations in the Early Universe, taking into account the neutrino self refraction mechanism mentioned above. We discussed about addressing this problem using a technique that we jointly developed with Prof. Kajino, Prof. Balantekin and Dr. Yoshida during my earlier visit to NAOJ involving the Bethe ansatz diagonalization of the effective many-body Hamiltonian.

II. 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。（Your research products from this stay）： We completed a paper together with Prof. Kajino, Prof. Balantekin and Dr. Yoshida entitled “Invariants of Collective Neutrino Oscillations” in which we present our results outlined in the activity topic (1) above. It is soon to submit to Phys. Rev. D after final revisions. We will also write another paper concerning (2) as soon as the first paper is completed.

III. この制度についてなにか御意見がありましたら、なんでも記入ください。（Any opinions on this exchange program）： We thank NAOJ for providing us the opportunity to come together to discuss new ideas in astrophysics and share our most up to date research. During my stay at NAOJ, I had the opportunity to discuss many aspects of neutrinos in astrophysics and astronomy not only with Prof. Kajino and Prof. Balantekin but also with Prof. Maruyama from Nihon University and Prof. Shibahashi from Univ. of Tokyo. This short term visitor program of NAOJ is very effective in promoting fruitful discussions and contributing to the advance of science, and therefore hope it be kept enriched further.