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P4.090 **Observations of presupernova neutrinos relating to the final evolution of massive stars**

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Neutrino emission is a main cooling process of massive stars during their advanced evolution. Neutrinos emitted from a presupernova star at the distance of a few hundred pc are expected to be observed tens hours before the supernova explosion by KamLAND, though the luminosity and average energy of the neutrinos are smaller than supernova neutrinos. Larger size liquid scintillation neutrino detectors could observe hundreds presupernova neutrinos and these signals relate to the final evolution of the star. In this study, we evaluate the neutrino events of presupernova stars by future large liquid scintillation detectors and relate the final evolution processes to the expected neutrino events.

We calculate the evolution of 12, 15, and 20 solar-mass star models until the core collapse. We also evaluate the spectra of neutrinos emitted by pair-neutrino process from the stars after the O burning. Then, we evaluate their neutrino events observed by KamLAND and JUNO assuming the distance of 200 pc to the stars. We expect that several to more than ten neutrino events will be observed by KamLAND depending on the stellar mass and neutrino mass hierarchy. In JUNO, 100-500 neutrino events are expected. The neutrino event rate increases with time during the core collapse and decreases for a moment when O and Si shell burnings proceed. We expect that the event number per hour after the Si core burning is more than ten and that the decrease in the neutrino events is observable by JUNO if the neutrino background is low. The neutrino events could be evidence for burning processes in the central region during the final evolution of a presupernova star.