EFFECTS OF COLLECTIVE OSCILLATION AND MSW MATTER EFFECT ON 3D HYDRODYNAMICS CORE-COLLAPSE SUPERNOVA MODELS

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We study possible impacts of collective neutrino oscillations and MSW matter effects on the neutrino signals. In order to quantitatively evaluate the supernova neutrino signals, it is indispensable to include the effect of collective oscillation of neutrinos [1,2] . Based on new sets of three-dimensional (3D) hydrodynamics models for 13 and 40 M_{solar} progenitor stars [3], we estimate the supernova neutrino signals, in which both of the collective oscillations [2] and MSW effects [4] are taken into account. Our results are in agreement with the work by [2] who showed that collective oscillations do not effect the revival of the stalled supernova shock. Futhermore we point out that collective oscillations could influence the subsequent evolution of the shock after the shock-revival especially for the lighter progenitor model. Neutrinos emitted from the proto-neutron star (PNS) interior propagating out to the stellar mantle change its flavor typically twice under the influence of the collective oscillations and the MSW. As a result, the signals of the anti-electron type neutrinos become relatively close to those emitted from the PNS. Therefore, from the neutrino signals, we could get the information of the anti-electron type neutrinos which are important to extract the information of the long-veiled explosion mechanism. By employing more variety of the progenitor models, we will discuss more in detail how the behaviors of neutrinos are sensitive to the employed progenitors.

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