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# Multi-Angle Simulations of Matter-Neutrino Resonance

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Neutrino flavor transformation in compact object mergers can be dominated by matter-neutrino resonances (MNRs). By efficiently converting electron neutrinos to other species, MNRs can affect nucleosynthesis and the dynamics of the merger. Prior to our work, calulations of MNR have used the single-angle approximation, only following flavor evolution along a single neutrino trajectory. However, self-consistency requires that all trajectories be treated simultaneously. It was not known whether MNR phenomena would be present in a multi-angle model, or whether they were merely an artifact of the single-angle approximation. We present the first fully multi-angle calculations of MNR, finding that some familiar features of single-angle MNR are still present. However, there are qualitative differences compared to the single-angle results. We show that the type of flavor transformation seen in multi-angle MNR is extremely robust, occurring with relatively little change under a wide variety of physical conditions. This suggests that neutrino flavor transformation due to MNR can play an important role in merger environments, and does not strongly depend on detailed assumptions about the matter distribution, neutrino spectrum or composition.

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