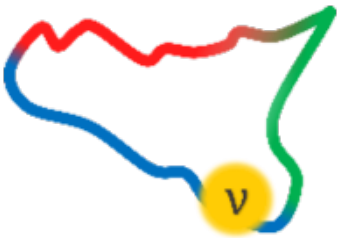

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PNS parameters estimation with neutrino emission from supernovae

Friday, 20 June 2025 17:07 (7 minutes)

A novel functional form for fitting neutrino luminosities from core-collapse supernovae was recently proposed by Lucente et al. (2024), capturing the effects of convection inside the proto-neutron star (PNS) through a power-law temporal decay. While this model accurately describes the cooling phase, it does not account for the neutrino flux during, approximately, the first second, which is primarily driven by accretion. To address this, we introduce an additional term that models the early post-bounce phase in a simple yet effective way. After validating this extended model against multiple simulation datasets, we explore its applicability to SN1987A data. This approach allows us to extract meaningful estimates of the PNS temperature and radius. The radius is of particular interest, as it is closely linked to gravitational wave (GW) emission. Improved radius estimates may therefore enable joint neutrino-GW detection strategies and enhanced multi-messenger parameter inference.

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