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Selecting Hadronic Supernova Remnants for Targeted Galactic Neutrino Searches

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Neutrinos provide unambiguous evidence of cosmic-ray (CR) acceleration in supernova remnants (SNRs), as they are produced exclusively in hadronic interactions. Detecting neutrinos from a SNR would offer direct confirmation of CR proton interactions and energy distributions. In this work, we conduct a comprehensive survey of Galactic SNRs to identify the most promising hadronic candidates. For this subset, we model the expected neutrino spectra and compile a prioritized source list for a future IceCube stacking analysis. Excluding leptonic-dominated SNRs from IceCube analyses is crucial for improving the signal-to-noise ratio and has the potential to enable the first detection of Galactic SNRs in neutrinos.

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