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Origin of Rare Isotopes in Presolar Grains as the Probe of Neutrino Mass Hierarchy and Supernova Nucleosynthesis

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Here we present our study on isotopic ratios of several typical neutrino-process nuclides in core-collapse supernova. We find that the measurement of isotopic ratios like $^{11}\text{B}/^{10}\text{B}$ with $^{138}\text{La}/^{139}\text{La}$ or $^6\text{Li}/^7\text{Li}$ can constrain neutrino mass hierarchy, providing new probes for understanding CCSN nucleosynthesis. Additionally, we show that the correlation between $^{138}\text{La}/^{139}\text{La}$ and $^{50}\text{Ti}/^{48}\text{Ti}$ in calcium-aluminum inclusions (CAIs) can be quantitatively explained by CCSN models with weak s-process, suggesting that CCSNe contributed to the early solar system's material. Our results indicate that isotopic abundance analysis in CAIs and presolar grains is crucial for understanding the origins of these rare isotopes.

- [1] Y. Luo, T. Kajino, T. Hayakawa and Tsuyoshi Iizuka (2025), to be published.
- [2] X. Yao, T. Kajino, Y. Luo, et al., *Astrophys. J.* 980 (2025), 247 (21pp).
- [3] X. Yao, Y. Luo, T. Kajino, et al., *Chinese Phys. C* (2025), submitted.

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