

Unveiling the Mystery of Technetium-Rich M Stars: Implications for AGB Evolution

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The technetium(Tc) -rich M stars reported in the literature (Little-Marenin & Little 1979; Uttenthaler et al. 2013; Shetye et al. 2022) are puzzling objects since no isotope of technetium has a half-life longer than a few million years, and ^{99}Tc , the longest-lived isotope along the s-process path, is expected to be detected only in thermally-pulsing stars enriched with other s-process elements (like zirconium). The anomaly deepens as carbon enrichment is anticipated in tandem with zirconium, following each thermal pulse on the asymptotic giant branch (AGB). Surprisingly, the Tc-rich M stars lack significant zirconium enhancement (which would categorise them as S-type stars) and display no substantial carbon overabundance (which would label them as carbon stars).

In my talk, I'll present a systematic high-resolution study of a large sample of Tc-rich M stars. I'll delve into the spectral properties of these stars, and its comparison with those of Tc-rich S stars. Additionally, I'll present their s-process element abundance analysis, accompanied by a comparison of their location on the HR diagram with Tc-rich S-type stars. Lastly, I will discuss the role of Tc-rich M stars as the potential tracer of the onset of the third dredge-up.

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