

# Do Technetium-rich M stars pose a challenge to our understanding of third dredge-up physics?

*Tuesday 11 June 2024 12:30 (20 minutes)*

The technetium-rich (Tc-rich) M stars reported in the literature (Little-Marenin & Little 1979; Uttenhaler 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. Hence,  $^{99}\text{Tc}$ , 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 high-resolution study of a large sample of Tc-rich M stars. I'll delve into the challenges associated with determining their atmospheric parameters and propose effective solutions. 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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