Determining the luminosity of the third dredge-up: The promise of *Gaia*

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INTRODUCTION

What is the third dredge-up (TDU)?

TDU is a mixing process in the Asymptotic Giant Branch (AGB) stars, responsible for transporting matter from the AGB central regions to its surface.

What will we understand from the TDU?

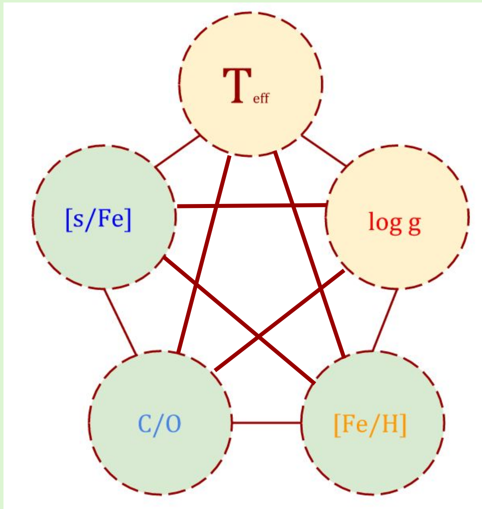
TDU physics ⟶ AGB nucleosynthesis ⟶ heavy element production inside the AGB stars.

But the AGB spectra are heavily blended with molecules and heavy element lines, *how can we study TDU using it?*

Check our method combining optical spectra, photometry and *Gaia* to disentangle the intricated stellar parameters of AGB stars (Shetye et al. 2018)

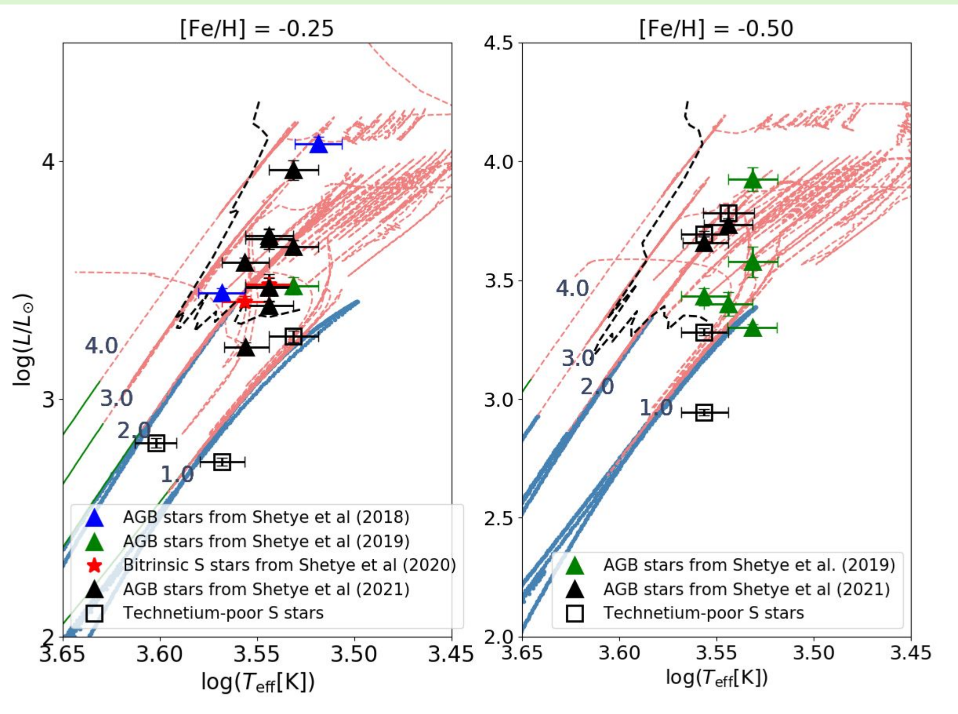
METHODOLOGY

GAIA EDR3 + STAREVOL tracks



High-res data + MARCS models

What can we learn from the Gaia EDR3 HR diagram of AGB stars?



In pink ⟶ AGB tracks In blue ⟶ Red-giant branch

- With *Gaia,* we have discovered the ***occurrence of TDU in low-mass*** (~1 Msun) with solar-like metallicities (Shetye et al. 2019).
- Technetium-rich stars lie above the predicted onset of TDU. ***Technetium ⟶ useful tracer of the thermally-pulsing AGB phase***.
- The heavy element abundance profiles are in agreement with their evolutionary status (Check our Haiku).

*In figure, evolutionary tracks from STAREVOL and metallicities derived using the HERMES high-resolution data.

To know more about our recent work on the heavy-element production inside AGB stars or the observational constraints on the TDU physics, click here.