RED GIANTS

A gauge of stellar age

Mon. Not. R. Astron. Soc. **487**, 4343–4354 (2019)

How can a group of red giant stars, known as α-rich stars, appear both young and old? Low levels of detected iron (compared to magnesium, silicon and calcium) suggest an evolved star older than 10 billion years. Yet the high stellar masses of those same stars, as determined by asteroseismology, suggest a younger star of 6 billion years. Saskia Hekker and Jennifer Johnson set out to account for the four-billion-year discrepancy.

Using a selection of stars from the APOGEE-2 (Apache Point Observatory Galactic Evolution Experiment) data release, and the APOKASC catalogue from Kepler (with spectrographic as well as asteroseismic data), the authors study the spectroscopic abundances of carbon, nitrogen and oxygen. These elements get dredged from stellar interiors to the surfaces of stars in strong plasma currents. At the surface, their ratios depend on how hot and how massive the star is. And for some of the stars those ratios are consistent with those for low-mass stars. Hekker and Johnson therefore conclude that the mass is not an intrinsic property of such stars, and that the heavy masses must be the result of mergers (or mass transfers from a binary companion) either during or after the dredging up of C, N and O from the stellar cores. The chemically old stars are indeed old.

May Chiao

Published online: 26 July 2019
https://doi.org/10.1038/s41550-019-0871-3