PHYSICS AND ASTRONOMY
COLLOQUIUM

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"The Oldest Stars"

Abstract

The nearby field halo subgiant, HD 140283, is the oldest star for which an especially reliable age has been determined. Although the current best estimate of its age is approximately 14.0 Gyr, which is just slightly older than the age of the universe from *Planck* and *WMAP* observations of the cosmic microwave background (13.8 +/- 0.1 Gyr), a formation time 0.2-0.3 Gyr after the Big Bang is within current uncertainties. Curiously, if HD 140283 is used as a standard candle to derive the distance of the very metal-poor globular cluster M92, which is believed to have nearly the same chemical composition, the inferred luminosity of its core helium-burning (horizontal branch) stars is much fainter than predicted by current stellar models. Alternatively, M92 is younger than HD 140283 or the assumption that both objects have similar chemistries is wrong. To investigate this problem, comparisons of evolutionary tracks for the core He-burning phase with the observed horizontal-branch population of M92 are carried out - including a comparison of the predicted and observed properties of its RR Lyrae variable stars. The RR Lyraes in the more metal-rich globular cluster M3 are similarly analyzed in order to check how well stellar models are able to reproduce the observed differences in the mean periods of the fundamental and first-overtone pulsators in M3 and M92. The implications of these results for the relative ages of M92, M3, and HD 140283 are discussed.

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3:00 p.m.
Bob Wright Centre
Room A104