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国台学术报告 NAOC COLLOQUIUM

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Time: Wednesday 2:30 PM, May.15th Location: A601, NAOC

Carbon-Enhanced Metal-Poor Stars: Probes of First-Star Nucleosynthesis and Galaxy Assembly

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Timothy Beers is the Grace and Rupley Professor of Physics at the University of Notre Dame. He is a former director of the US Kitt Peak National Observatory, and spent 25 years working as a Professor of Physics & Astronomy at Michigan State University. Beginning over a decade ago, he has worked with faculty and students in China to develop and refine the science plans for LAMOST, including the pipeline software used for determination of stellar parameter estimates.Professor Beers is interested in the origin and evolution of the elements in the Universe, and the assembly of large spiral galaxies such as the Milky Way, a field now referred to as Galactic Archaeology. For decades, Professor Beers has designed and executed large-scale surveys of stars in the Milky Way, efficiently sifting through literally millions of individual stars in order to find those rare objects that have recorded the chemical history of the Universe in their atmospheres. His early survey work was the first to demonstrate the existence of significant numbers of stars with metallicities below [Fe/H] = -3, and set the stage for many of the most important results in Galactic Archaeology today. His work has led to the identification of a subset of the so-called carbon-enhanced metal-poor (CEMP) stars that exhibit a characteristic light-element signature (enhanced C, N, O, Na, Si, Mg), now recognized to be due to nucleosynthesis processes associated with the very first stars born in the Universe. In addition, he leads an ongoing survey effort, the R-Process Alliance, with the goal to quadruple the numbers of stars recognized in the Galaxy with highly enhanced r-process elements, providing crucial constraints on the nature and astrophysical site(s) of the rapid neutron-capture process, responsible for the production of over half of the elements beyond iron in the Periodic Table.

Abstract

Over the course of the past few decades, it has become clear that the class of metal-poor stars known as carbon-enhanced metal-poor (CEMP) stars are powerful probes of a number of areas of interest to contemporary astrophysics. I review the multiple lines of evidence that demonstrate the association of CEMP-no stars (which do not exhibit neutron-capture element enhancements) with the nucleosynthesis products of the very first stars, their likely birth place in low-mass mini-halos, and (once accreted by the halo) their role as tracers of the outer-halo population of the Galaxy. The CEMP-s stars (which exhibit enhancements of the heavy s-process elements), by contrast, are likely to have been born in more massive mini-halos, and serve as tracers of the inner-halo population. The well-known increasing frequency of CEMP-no stars (and newly recognized relative constancy of CEMP-s stars) with declining metallicity, and the identification of the primary groups in the Yoon-Beers diagram of A(C) vs. [Fe/H], provide the means to explore these associations in more detail, and to constrain numerical models of the formation of the Milky Way.

All are welcome ! Tea and coffee will be served at 2:15 PM.