CINA+COSNAP Colloquium

First Steps in the Chemical Evolution of the Universe

Speaker: Michael Wiescher University of Notre Dame
Time: 7pm, June 10, 2021, Thursday (Beiing)
Connection:

Speaker profile :

Michael Wiescher received his PhD in Physics in Munster, Germany. He held research positions at Ohio State University, Caltech, and the University of Mainz, Germany before he joined 1986 the faculty of the University of Notre Dame. His research is focused on nuclear astrophysics studying the origin of elements in our Universe and the nature of nuclear processes in stars and stellar explosions. He is the Freimann Chair of Physics and Director of the Institute for Structure and Nuclear Astrophysics, a university research center and accelerator laboratory. From 2002 to 2014, he served as the first director of the Joint Institute for Nuclear Astrophysics, a Physics Frontier Center of the National Science Foundation between Notre Dame, the University of Chicago, and Michigan State University as well as a number of other national and international research institutions.

Abstract :

The chemical evolution of the universe is dictated by nucleosynthesis processes in multiple generations of stars as the cauldrons of the cosmos. The first generation of stars burn on the ashes of the Big Bang, the primordial abundances of hydrogen, helium and a bit of lithium. The chemical analysis of the eldest observed stars, however, shows a pronounced abundance distribution between carbon, oxygen up to calcium with a few scattered observations of Fe, Ti, and Sr. The reaction chains bridging the mass gap of instability at A=5 and A=8 isotopes and feeding the CNO range, rely on the alpha cluster configuration of light nuclei. Several possible nucleosynthesis patterns will be discussed that facilitate further processing of CNO isotopes up to the Ca-Fe range. These first steps in the chemical evolution of the universe will be presented in the context of new experimental data, which provide new insight in the complex and highly dynamic nucleosynthesis environment of first stars.

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