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Galactic evolution of carbon and oxygen abundances

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Dr. Poul Erik Nissen is Professor Emeritus at the Stellar Astrophysics Centre, Department of Physics and Astronomy, University of Aarhus, Denmark. He has been Visiting Scientist at leading USA observatories and at the European Southern Observatory using high-resolution spectrographs, including UVES at the ESO/VLT, to study elemental abundances in stars relating to Galactic chemical evolution and Big Bang nucleosynthesis. Recently, he has found evidence that the Galactic halo consists of two distinct populations with high and low abundances of the alpha-capture elements relative to iron, which supports a dual formation scenario of our Galaxy.

Abstract

Next to hydrogen and helium, carbon and oxygen are the most abundant elements in the Universe. Oxygen is synthesized in massive stars and dispersed to the interstellar medium by core collapse supernovae. The origin of carbon is more uncertain but both high- and low-mass stars probably play a role in the evolution of the carbon abundance in our Galaxy.

I will present some new results on C and O abundances in about 150 solar-type stars ranging in metallicity from $[\text{Fe}/\text{H}] = -3.5$ to $+0.5$ as determined from a non-LTE analysis of CI and OI atomic lines in high-resolution spectra. Distinct trends of $[\text{C}/\text{Fe}]$ and $[\text{O}/\text{Fe}]$ as a function of $[\text{Fe}/\text{H}]$ are found for high- and low-alpha halo stars and for thick- and thin-disk stars. These trends and that of $[\text{C}/\text{O}]$ provide new information on the nucleosynthesis sites of C and O and the timescale for the chemical evolution of the various Galactic components. A relatively high C/O ratio at the lowest metallicities may be due to carbon production in population III stars. At the highest metallicities, the C/O ratio is higher than in the Sun, but not high enough to allow formation of "carbon planets".



All are welcome! Tea, coffee, biscuits will be served at 2:15 P.M.

You are welcome to nominate speakers to Weimin Yuan (wmy@nao.cas.cn), Mei Zhang (zhangmei@bao.ac.cn), Licai Deng (licai@bao.ac.cn), Xuelei Chen (xuelei@cosmology.bao.ac.cn), Shude Mao (smao@nao.cas.cn)