**Abstract:**
The chemical evolution of the Galaxy and the early Universe is a key topic in modern astrophysics. Since the most metal-poor Galactic stars are the local equivalent of the high-redshift Universe, they can be employed to reconstruct the onset of the chemical and dynamical formation processes of the Galaxy, the origin and evolution of the elements, and associated nucleosynthesis processes. They also provide constraints on the nature of the first stars and SNe, the initial mass function, and early star formation processes. The discovery of two astrophysically very important metal-poor objects recently lead to a significant advance regarding these topics. One object is the most iron-poor star yet found (with [Fe/H]=-5.4). The other star displays the strongest known overabundances of heavy neutron-capture elements, such as uranium, and nucleo-chronometry yields a stellar age of ~13 Gyr. Metal-poor stars, once also identified in dwarf galaxies, are vital probes also for near-field cosmology. Their chemical signatures now suggest that systems like these were building blocks of the Milky Way's low-metallicity halo. This opens a new window to study galaxy formation through stellar chemistry.