

Modeling of the chemical evolution of the Milky Way and its satellites

PROJECT DESCRIPTION

The Fellow will work within the PRIN 2022 project “LEGO - *Reconstructing the building blocks of the Galaxy by chemical tagging*”. This project is aimed at mapping the chemical heritage of the Milky Way and its satellites, allowing us to reconstruct the chemical enrichment histories of the dissolved satellites that contributed to the formation of our home galaxy.

Chemical evolution models are a fundamental tool to interpret the abundances that we measure in the stellar populations of these galaxies. These models, in fact, follow the variation of the abundances of different chemical elements in space and time in the interstellar medium of galaxies, considering various physical processes - inflow and outflow of gas, star formation, chemical and energetic feedback from stars, as well as radial motions of gas and stars. The calculation of appropriate and updated chemical evolution models is crucial to understand the evolution of the local galaxies and reconstruct their assembly histories, in particular identifying relics of past accretion events occurring in their evolution.

ACTIVITY PLAN

The candidate will work at the calculation and testing of proper chemical evolution models tailored to the Milky Way halo and to specific galaxies of the Local Group (i.e., the Large and Small Magellanic Cloud and the Sagittarius dwarf spheroidal galaxy). Detailed abundances from high-resolution spectroscopy for stars in the Milky Way halo, in the Large and Small Magellanic Cloud and in the Sagittarius dwarf spheroidal galaxy have been already secured by our team.

Specifically, the postdoc will study the effect of different nucleosynthesis prescriptions on the chemical evolution of the different galaxies. In particular, the candidate will test the new yields for SN Ia events appeared in the last years, with a significant impact on some elements (like V and Ni) that display radically different trends with metallicity in dwarf galaxies with respect to the Milky Way. The candidate will study also the impact of hypernovae on the behavior of particular chemical elements, such as, for instance, Zn, in the Galaxy and its satellites. This element be used to probe the shape of the galaxy-wide initial mass function in galaxies.

This project calls for candidates with proven expertise in the calculation of chemical evolution models of galaxies, as well as a solid background in stellar nucleosynthesis and evolution.

The appointee will work closely with Alessio Mucciarelli and other researchers involved in the project, i.e. Donatella Romano, Michele Bellazzini and Davide Massari of the INAF-OAS.