

Measuring chemical abundances in stellar spectra

Galactic Archaeology is a complex and exciting subject. By observing stars in our Galaxy, we can gather precious information on its past assembly process (fossil stars), and the present state of its evolution and enrichment. Moreover, the atmospheres of the oldest stars maintain the fossil signatures of the chemical pollution created by the first stars. These signatures are at the cuspid of the efforts that, at the crossing of nuclear physics and stellar evolution models, enables the predictions of stellar nucleosynthesis. It is a golden age for these studies thanks to GAIA and its spectroscopical follow-ups. Trieste has always had an international impact in this area and wants to be ready to exploit at best these future results.

Within the “Galactic Archaeology in Trieste” (GAT) team, the PhD student will learn how to deal with the spectra of these ancient stars and extract from them the abundances of chemical elements. She/He will be part of the MINCE (Measuring at intermediate metallicity Neutron Capture elements) survey (PI Cescutti), an international survey devoted to the study of the most elusive elements, from the very heavy thorium to the (relative) light zirconium. MINCE has a strong participation of the stellar team working at the Observatoire de Paris (Bonifacio and Caffau) and a period of exchange is envisaged.

Thanks to her/his work on spectral synthesis, the PhD candidate will be also involved in the study for building up the next generation of instruments at ESO, in particular, CUBES@VLT, devoted to the UV, and HIRES @ELT, the future 39m telescope. Both instruments will be made with the fundamental contribution of the Trieste Observatory.

Finally, she/he will also join the efforts of ChETEC-INFRA (Chemical Elements as Tracers of the Evolution of the Cosmos. INFRAstructures for Nuclear Astrophysics), a starting community founded by the EU, offering transnational access to four telescopes.

The PhD student is expected to work mainly on the observational and stellar analysis perspective, but the chemical abundances obtained will be used the theoretical side addressing Galactic problems or the evolution of the elements in the Galaxy and in the satellite galaxies of the Milky Way thanks to the expertise within the team.

Contacts:

gabriele.cescutti@inaf.it -> MINCE, chemical evolution models;
mariagrazia.franchini@inaf.it -> Spectral Synthesis, chemical abundances;
paolo.dimarcantonio@inaf.it -> Instruments & Spectral Synthesis;