

Science with ESPRESSO

ESPRESSO is a new generation, innovative spectrograph, collecting the light of all 4 units of the European Very Large Telescope (situated in Chile). It is characterized by a very high spectral resolution ($R=120,000$) and an extreme stability for precision measurements.

ESPRESSO has started collecting data in 2018. INAF-Osservatorio Astronomico di Trieste is a member of the international consortium which built it and has access to the 270 guaranteed observing nights in the period 2018-2021.

PhD PROJECT

The successful PhD Candidate will analyze the first scientific data produced by ESPRESSO to address one or more of the following fundamental questions in Cosmology and Fundamental Physics:

- Does the standard big bang model make the correct predictions about the primordial element abundances and the temperature evolution of the Cosmic Microwave Background?
- Which physical mechanisms dominate the cycle of baryons determining the formation and evolution of galaxies?
- What are the physical conditions and the chemical evolution of the intergalactic medium at various redshifts?
- Do fundamental constants of Physics (e.g. the fine structure constant or the proton-to-electron mass ratio) vary with cosmic time?
- Is it possible to measure directly the expansion of the Universe using the redshift drift of objects following the Hubble flow?

The successful Ph.D. Candidate will also participate in the design of the HIRES spectrograph for the Extremely Large Telescope (ELT) and is expected to become a leading scientist in the exploitation of the data produced with this instrument.

References: *"From CODEX to ESPRESSO to HIRES@EELT: a view on cosmology and fundamental physics from the IGM perspective"*, Cristiani, S., Cupani, G., D'Odorico, V., et al. 2015, Mem.S.A.It. 86, 486.

"ESPRESSO: The next European exoplanet hunter", Pepe, F., Molaro, P., Cristiani, S., et al. 2014, AN, 335, 8.

Contacts: Prof. Stefano Cristiani, Dott. Guido Cupani, Dott. Valentina D'Odorico, Prof. Paolo Molaro.
stefano.cristiani@inaf.it – guido.cupani@inaf.it – valentina.dodorico@inaf.it – paolo.molaro@inaf.it