

**Título/Title:**

Studying the impact of cluster environments on the evolution of their galaxies

**Orientador/Supervisor:**

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**Descrição/Description:**

Galaxy clusters are the largest gravitationally bound structures in the universe. Their member galaxies are known to be quite different from those found in the field in what regards properties such as morphology, star formation rate, stellar and gas content. This is thought to be caused by the higher density environment that the cluster provides: from both observations and simulations, it is expected that galaxy evolution is accelerated in clusters through different physical processes at work in these specific environments.

To unveil which is the dominant physical process at work, we study the evolution history of a galaxy, encoded in its emission spectrum, and relate it with the cluster environment in which the galaxy resides. This can be done with spectral synthesis: a technique which models the formation history of galaxy stellar populations based on the best fit to its currently observed spectrum.

The project will use the results of applying a new spectral synthesis code, FADO, developed at the IA to study the formation histories of a sample of cluster galaxies. The spectra are from the Sloan Digital Sky Survey (SDSS) and have been processed by FADO. The student will gain an understanding of how to interpret the spectra of galaxies and use data from FADO to explore how the star formation histories (SFH) of the galaxies relate to other galaxy properties (colors, gas content, morphology when available), to galaxy location inside the clusters, and to the properties of their parent clusters. For example: the student will use FADO output to look for trends in the fraction of stars formed within the last Giga-year as a function of distance from the cluster center for both relaxed and merging clusters. By getting acquainted with the physical processes at work within clusters, the student will interpret his/her results and gain insight on what is the main driver of galaxy evolution in the clusters under study.