
Star clusters around galaxies in isolation, in groups and in galaxy clusters – the dependence of their detailed energy distributions on environment

DIRECTEUR DE THESE : ARIANE LANÇON

OBSERVATOIRE ASTRONOMIQUE DE STRASBOURG, 11 RUE DE L'UNIVERSITE,
67000 STRASBOURG

TEL : +33 -(0)3 68 85 24 24 ; E-MAIL : ARIANE.LANCON@ASTRO.U-STRASBG.FR

Star clusters have formed since the earliest epochs of star formation in the universe, and are found in and around essentially all galaxies. Their histories are diverse, and the clusters we see are only those that survived the harassment by their environment. Inside a galaxy cluster, the globular clusters (GC) of disrupted dwarf galaxies contribute to the population of GCs in the halos of massive galaxies. Some GCs are ejected into intergalactic space or, on the contrary, mark the center of larger galaxies. The relationship between GCs, central clusters in galaxies (CCG) and ultra-compact galaxies (UCD) remains a matter of debate that large samples, compared with numerical simulations and detailed stellar population models, will help settle.

The PhD fellow will exploit recent deep near-infrared surveys with the ESO/VISTA telescope in Chile (co-I A.L., well established collaboration), of galaxies in isolation (e.g. the Sombrero galaxy), galaxies in small groups (two fields), galaxies in clusters (among which Fornax and Virgo) to produce large and homogeneous GC (and UCD) samples. The near-IR is a critical range, without which the separation of compact stellar systems from foreground stars or background galaxies in imaging surveys is *much* more difficult (e.g. Muñoz, Puzia, Lançon et al. 2014). It has already been exploited for the central 4 square degrees of the Virgo cluster, showing complex behaviours of GC colors (articles of Powalka, Lançon et al over the last few years). Data for about ten times that area, in various environments, has now been acquired. The fellow will actively participate in the reduction of these wide-field images, in collaboration with Pr. T. Puzia in Chile (financial support for a first 1-month visit to Santiago in 2018 is already available). He will match the near-IR data with existing optical catalogs available within the collaboration, and publish the trends discovered among these, as a function of environment.

The team in which the PhD fellow will be working is involved also in a large program that aims at modeling the spectra of galaxies using new UV to near-IR spectra of large collections of stars, obtained with the X-shooter spectrograph on the Very Large Telescope (ESO, Chile). The fellow will be invited to follow the progress of this work, which is critical for the understanding of the trends he will uncover in the GC datasets. Depending on his personal interests and progress, he will be able to either use existing models or invest in adapting this modelling work to the particular case of GC. Close collaborators of A.L. in this area are P. Prugniel (Lyon) and the X-shooter Library Team (international), as well as a group of experts in the evolution and the peculiar surface chemistries of GC stars (Montpellier, Geneva).

A co-supervision with either Pr. T. Puzia in Santiago de Chile or Dr. P. Prugniel (HDR) in Lyon is being considered. Interest has been confirmed on both sides. The daily work will take place in the lively environment of the Strasbourg astronomical Observatory, which hosts numerous experts of galaxy evolution.

