



Centre de Recherche Astrophysique de Lyon UMR 5574

Proposition de stage de Master 2 Recherche Année académique 2019 – 2020

Responsable de stage : Philippe PRUGNIEL

@ : philippe.prugniel@univ-lyon1.fr

☎ : 04 78 86 85 45

Adresse/Lieu du Stage : CRAL - site Charles André : 9 avenue C. André, St Genis Laval

Équipe de recherche d'accueil : GALPAC

Intitulé du stage : Stellar population -- fundamental pre-requisites to the analysis of large galaxy surveys

Résumé du travail demandé :

Galactic globular clusters are universal benchmark for population studies because they can be studied both by their individual stars down to below the turn-off, or by their integrated light. The challenge is to reconcile the HR diagram reconstructed by fitting an integrated spectrum with a stellar population model to the one derived from individual stars.

The MUSE spectrograph allows one to build in a few pointing a full mosaic of a Globular cluster. From these data cubes, it is possible either to assemble an integrated spectrum, by stacking all the individual spectra together, or at the opposite to extract spectra of thousands of individual stars. We propose here to carry-on the two approaches. The integrated spectrum can be analysed using full-spectrum fitting and stellar population models, to derive the age and metallicity of the best fitting isochrone. The analysis of the individual spectra can separately give the position of the isochrone in temperature, surface gravity, and metallicity. The primary goal will be to compare the temperature and the metallicity of the giant branch at a set of gravities (morphology of the HR diagram), and explore how blue horizontal branch stars can bias the characteristics of the isochrone determined from the integrated light spectrum and devise approaches to avoid this bias (and to assess other possible biases, like the stochasticity, contamination by field stars...). At the end, we want to provide a method that will derive an age from integrated spectra consistent with the age from individual stars.

Progressing on the consistency between the integrated models and the individual stars has a fundamental impact on any study of stellar populations, like in particular the determination of the age, or history of star formation of galaxies. The models of the present generation that are being published now have to be qualified in this respect, and this test will be at the core of the future generation of models that will include a finer description of the stellar physics, like in particular the evolution of the surface abundances through the different evolutionary stages, the proper integration of stars on the asymptotic giant branch in the models, and the modeling of the blue horizontal branches.

The work requires skills in data handling and processing, and good skills at scripting languages. A continuation on a PhD is foreseen, with an orientation depending on the result of this work.

Type de financement envisagé pour le stage : CRAL - LIO

Indication éventuelle d'ouverture vers un sujet de thèse : Oui