



## Centre de Recherche Astrophysique de Lyon UMR 5574

### **Master 2 Research internship offer** **Academic year 2016 – 2017**

**Internship supervisor: Philippe PRUGNIEL**

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**Address/Workplace**<sup>1</sup>: CRAL - site Charles André : 9 avenue C. André, St Genis Laval

**Hosting research team**<sup>1</sup>: GALPAC

**Internship title:** A new generation of stellar population models: Spectra from the UV to the near-infrared

#### **Summary of proposed work:**

Models of stellar populations are the core of the interpretation of galaxies spectra in terms of star formation and metal enhancement histories. The light emitted by a galaxy or a star cluster is due to their inter-stellar medium, to a possible active nucleus, and to the stars. Because some stars have a long lifetime, studying the stellar populations gives access to the history of the systems.

To study stellar populations, we compare spectroscopic or photometric data to models of their spectral energy distribution. These models are synthesized by summing individual stellar spectra according to their predicted frequency, as a function of the age, metallicity, initial mass function, and history of the star formation. The recent improvement of the observations challenge the models, that although they reproduce the general patterns, fail at the details. The reasons for these difficulties are generally understood, and they are multiple. One of the bottleneck identified seven years ago is the quality of the underlying stellar spectra (the so-called stellar library), and a major effort was undertaken to tackle the problem. We designed and observed a new stellar library with the X-Shooter spectrograph attached to the VLT. The XSL library is now available to build and test the first stellar populations models.

During this training, we will synthesize population models using the PEGASE code, and test their quality by fitting spectra of galaxies. This new library has an unprecedented wavelength coverage, and we expect it to improve considerably the constraints on the history of the stellar populations, and on the stellar initial mass function. The experience acquired, will be a preparation to work with data from ongoing or future photometric or spectroscopic surveys such as MUSE, LSST, EUCLID, J-PLUS, ESO-Gaia, WEAVE, 4MOST, etc.

**Nature of the financial support for the internship:**

**Potential for a follow-up as a PhD thesis in the case of an M2 internship**<sup>1</sup>: Yes

[<sup>1</sup>] Select your choice