Master 2 Research internship offer
Academic year 2023 – 2024

Internship supervisor: Nicolas Bouché

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

Hosting research team: Galpac

Internship title: Automatic source classification with Machine Learning

Summary of proposed work:

The MUSE instrument on the European Very Large Telescopes is a powerful integral field spectrograph yielding hyperspectral data, with a spectra for each pixel in the field-of-view.
Each MUSE observations contains about 100 galaxies from redshift 0 to 6. Finding them blindly and sorting out the proper redshift solution is a challenging tasks. Some galaxies have only emission lines such as [OII] or Ly-alpha, while others have mainly broad stellar continuum. Algorithms exist to detect either the emission lines or on the broad continuum light, but none exist to perform both tasks simultaneously.

Currently, finding the redshift solution is a challenging task, which requires manual inspection of the possible solutions. The proposed project aims at automating the source detection and the redshift identification with Machine Learning (ML) techniques, such as deep Convolutional Neural Networks (CNN) using sample galaxies with redshifts extracted from various MUSE large programs from our team. This project will thus potentially transform the way one can extract and identify all galaxies in deep wide-field IFU observations.

This internship will focus on training CNN algorithms on several thousands (up to 10,000) 1D spectra extracted from deep (>10hr) MUSE data and applying the networks on shallower datasets.

This internship can lead to a thesis at CRAL. CRAL is leading or co-leading several next generation of instruments such as BlueMUSE/VLT, Harmoni/ELT, and 4MOST, which will allow the student to be well positioned on these large international projects for the 2020s

Prequisite: A keen interest in galaxy formation. Programming experience with python. Experience with git a plus.

Deadline: 15 November 2023

Duration: 4-6months

Nature of the financial support for the internship: ANR

Potential for a follow-up as a PhD thesis: Possibly, according the student performances.