

**Título/Title:**

AGNs from Narrow-Bandphotometric Surveys

**Orientador/Supervisor:**

Israel Matute ([imatute@oal.ul.pt](mailto:imatute@oal.ul.pt))

**Local do Estágio/Host Place:**

IA-Lisboa (Observatório Astronómico de Lisboa, Tapada da Ajuda)

**Descrição/Description:**

Given the strong links between the history of galaxy formation and super-massive black-holes (SMBH) activity, a proper estimate of the fraction of active galactic nuclei (AGNs; when the SMBHs are actively accreting) among local ( $z < 1$ ) galaxies is fundamental to better constrain current models of galaxy/AGN (co-)evolution. AGN selection based on long-slit and fiber spectroscopy can be strongly influenced by aperture effects. These effects can be very important for the fraction of low luminosity AGNs (LLAGNs) were the characteristic features of an accreting BH are in many cases diluted by the host galaxy starlight, especially important at increasing redshifts. Several studies have already shown that, for a fraction of local galaxies where the total spectroscopy classify them as non-active, nuclear spectroscopy can reveal the presence of such LLAGNs. These studies are limited to a small number of galaxies or restricted to the local Universe. For example, although the Sloan Digital Sky Survey (SDSS-I, -II & -III) provide by far the largest spectroscopic sample of the  $z < 1$  Universe to date, the size of the fibers that fed the spectrograph (2-3") include a significant fraction of host galaxy starlight for sources at  $z > 0.2$  and therefore biasing against LLAGNs. Nuclear spectroscopic data for a similarly large number of galaxies would be costly in telescope time but, alternatives approaches are already available using continuous photometric narrow-bands. ALHAMBRA is one of such surveys, providing continuous coverage of the optical and near-IR with a set of 23 filters and therefore an equivalent of very low-resolution spectra. With the objective to evaluate the presence of previously unknown LLAGNs, we propose to analyze a subsample of  $\sim 20k$  ALHAMBRA galaxies up to  $z \sim 1$  using the very-low resolution spectra provided by the ALHAMBRA photometry. Restricting our analysis to the photometry within the pixels of the central regions of the galaxies (0.5-1.0" resolution), we will explore the potential of similar (current and future) photometric surveys to provide a more precise census of AGN activity during the last 5Gyr.

**GOALS**

The main student's goal would be to:

1. Measure the nuclear photometry from a subsample of ALHAMBRA galaxies after a cross-correlation of known AGN both in the optical and in the X-rays;
2. Analyze the derived photometry by fitting the data to known normal, star-forming and AGN galaxy templates in order to quantify a possible AGN contribution.

During this 3 month period, the student will acquire a basic understanding of AGNs, their signatures in optical data and their importance in galaxy evolution. She or he will also be introduced to key concepts of photometric measurements, spectral energy distributions of galaxies and tools to fit observed data.