Student Project

Fitting spectral energy distributions of galaxies/AGN

December 2019

Galaxies emit electromagnetic radiation over the whole frequency/wavelength range, from the radio (low energies) to X-rays/Gamma-rays (high energies). Analysis of this radiation is the main tool that astronomers use to study distant galaxies and thus learn about their formation and evolution. The distribution of energy over wavelength/frequency is called the Spectral Energy Distribution (SED). The main approach to analyze the SEDs is through SED-fitting, e.g. comparing the data to physical theoretical or semi-empirical models . The public code AGNfitter is one tool for SED-fitting, written in Python, that performs the analysis of spectral energy distributions of galaxies hosting an accreting black hole in their centers, an 'Active Galactic Nuclei (AGN)'.

This project

The main aim of this project is to apply the most recent unpublished version of AGNfitter to a well defined data sets of nearby AGN and high-redshift AGN. The goal of this experiment is to understand how the physical parameters inferred from the data change using different models. Depending on the progress of the project, it may extend to deal with the question of the fraction of AGN in the Universe which is obscured by dust and gas.

Data sets

Nearby Galaxies:

- Brown et al. 2018 data set. I will build an Google Drive with these data soon.

High-z data:

- Will be defined soon.

Literature and links

- **The AGNfitter paper and code**
  - Paper: https://arxiv.org/pdf/1606.05648.pdf
  - Code: https://github.com/GabrielaCR/AGNfitter
  - One presentation I did once on the code: http://www.iap.fr/vie_scientifique/colloques/Colloque_IAP/2016/videos/Gabriela_Calistro_Rivera_2016-06-21_1155/
- **The Brown et al paper.**
  - Paper: https://ui.adsabs.harvard.edu/abs/2019MNRAS.489.3351B/abstract
  - Data: Google Drive (soon)

Others:

- Nice video introduction on AGN
  - https://www.youtube.com/watch?v=5XjtrDQwqKE&list=PLAZ0_vZHu1PveLyOd2utSAkX1-8V9vqI0&index=7&t=0s
- Nice undergrad-friendly summaries of papers:
  - General on galaxies and AGN: https://astrobites.org/guides/galaxy-and-agn-types/https://astrobites.org/guides/galaxy-and-agn-types/
  - On how to find AGN (AGN selection) https://astrobites.org/2012/12/16/separating-agn-activity-from-star-formation-at-high-redshift/
- General where to find publications:
  - https://ui.adsabs.harvard.edu