Estimating the stellar masses of NLS1 galaxies using multi-frequency observations

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Active galaxies are galaxies with an active supermassive black hole in their centre. This active galactic nucleus (AGN) often exhibits an extremely high luminosity, broad emission lines, strong variability in brightness and sometimes jets. Jets are collimated outflows of plasma, originating when matter orbiting the black hole shoots outwards of the galaxy instead of falling in. The strongest jets can reach relativistic speeds and kilo- or megaparsec scale sizes. According to the outdated jet paradigm, only the most massive elliptical AGN were thought to be able to launch relativistic jets.

AGN are classified into four categories: quasars, blazars, Seyfert galaxies and radio galaxies. In this presentation we are focusing on a sub-class of Seyfert galaxies, narrow-line Seyfert 1 galaxies (NLS1s). They are relatively small and young spiral galaxies that are typically dim at radio frequencies. However, a substantial number of them have been observed to host kilo- and sometimes even megaparsec scale relativistic jets. This is in complete contradiction with the jet paradigm and has forced astronomers to rethink what is actually needed to form a powerful jet. Therefore, NLS1s are a very interesting research topic as studying them could reveal us more about the properties required for jet formation in AGN.

The aim of this project is to study the properties, especially the stellar masses, of 138 host galaxies of NLS1s. Stellar mass refers to the total mass of all stars within a galaxy. While few previous estimates exist for the stellar masses of NLS1s, knowing their stellar mass could help with finding out what makes them so unique as well as revealing possible differences between jetted and non-jetted NLS1s. The stellar masses are estimated using CIGALE (a Python Code Investigating GALaxy Emission), which combines multi-wavelength observational data with Bayesian analysis to derive galaxy properties. To do this, a large amount of observational data, especially far-infrared data were collected from catalogues. Far-infrared data is essential for this project, as it originates from stars and is therefore needed for stellar mass estimation.

The average stellar mass for all sources was around $3.0 \cdot 10^{10}$ solar masses. This is a reasonable estimate for a spiral galaxy. Additionally, sources with detectable radio emission appear to have slightly higher stellar masses compared to those without. However, the results and conclusions of this project are still being finalised.