Using a series Machine Learning models for the detection of high-redshift Radio Galaxy candidates.

Rodrigo Carvajal*[1], José Afonso , Israel Matute , Stergios Amarantidis , and Davi Barbosa

[1]Institute of Astrophysics and Space Sciences - University of Lisbon – Portugal

Abstract

Recent observations of quasars at very high redshifts pinpoint the presence of supermassive black holes (SMBH), which trigger the formation of active galactic nuclei (AGN) at early epochs –redshift values greater than 6–. From models and simulations, it is projected that these early AGN can be detected in radio frequencies –for which these AGN are also known as Radio Galaxies, RG–, although the characteristics and triggering processes of their radio emission are still quite indeterminate.
It is projected to observe a large number of high-redshift AGN, but up to this moment, no more than 250 AGN at redshift higher than 6 have been detected from optical observations. And from the full sample of currently known high-redshift AGN, only a small fraction have been detected in radio frequencies as sufficiently deep radio observations are often non-existent for a large proportion of the sky.

In light of the projected number of high-redshift AGN and Radio Galaxies, critical attention has been drawn to developing procedures to predict their detection and properties given previously available information. Future large-scale radio observatories (such as the SKA Observatory), surveys, and their ongoing precursors (EMU, MIGHTEE, LoTSS), with their very large output data volumes, will make applying regular AGN detection techniques an inefficient task in terms of running time and computational resources.

As a way to tackle this challenge, we have implemented a series of Machine Learning (ML) models –classification and regression– which take photometric catalogues –in several wavelength bands– as input and produce a list of Radio Galaxy candidates, along with their predicted redshift values.

We will present early results of the use of these ML models with data from photometric catalogues in the HETDEX Spring Field (_˜400 deg2) and the Stripe 82 Field (_˜100 deg2).

Slides: in PDF
Video: https://youtu.be/J9Nq128lYog

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*Speaker