

Finding the brightest QSOs with QUBRICS

Monday 14 July 2025 12:30 (30 minutes)

The QUBRICS (QUasars as BRight beacons for Cosmology in the Southern hemisphere) survey is designed to produce a sample of the brightest quasars with $z \sim 2.5$, observable with facilities in the Southern Hemisphere, taking advantage of a score of recent and forthcoming databases: Gaia, Skymapper, PAN-STARRS, WISE, Euclid, Rubin etc.

Identifying high-redshift QSOs involves two challenges: first, distinguishing QSOs from stars, galaxies, and other celestial objects, and second, accurately estimating their redshifts to exclude low-redshift candidates.

The QUBRICS project has devised a strategy that includes the creation of an efficient database to train both classification and regression models. The survey employs Machine Learning techniques specifically tailored for extracting the rare QSOs from the vast datasets of optical and infrared wide-field surveys, optimizing various approaches to maximize either completeness or success rates based on specific scientific goals.

This talk outlines the lessons learned in the field of machine learning, which have potential applications across diverse fields beyond astrophysics. Furthermore, it presents new results about the evolution of the QSO/AGN luminosity function (in conjunction with recent JWST observations), the AGN contribution to the cosmic UV background and HI and HeII reionization, a pilot program on the Sandage test of the cosmic redshift drift using the two brightest QSOs in the southern hemisphere and the Espresso QUasar Absorption Line Survey.

Authors: GRAZIAN, Andrea (Istituto Nazionale di Astrofisica (INAF)); TROST, Andrea (University Tübingen); FONTANOT, Fabio (Istituto Nazionale di Astrofisica (INAF)); Dr GUARNERI, Francesco (Hamburg University); CALDERONE, Giorgio (Istituto Nazionale di Astrofisica (INAF)); CUPANI, Guido (Istituto Nazionale di Astrofisica (INAF)); Dr BOUTSIA, Konstantina (NOIRLab); PORRU, Matteo (Istituto Nazionale di Astrofisica (INAF)); Prof. CRISTIANI, Stefano (Istituto Nazionale di Astrofisica (INAF)); D'ODORICO, Valentina (Istituto Nazionale di Astrofisica (INAF))

Presenter: Prof. CRISTIANI, Stefano (Istituto Nazionale di Astrofisica (INAF))

Session Classification: I day