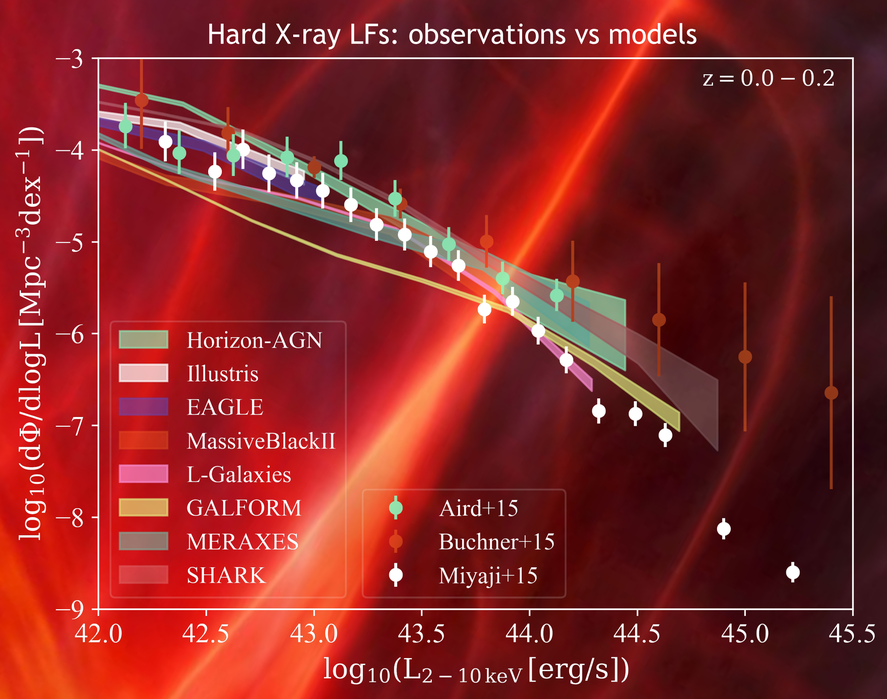
TOWARDS THE DETECTION OF THE FIRST SMBHS

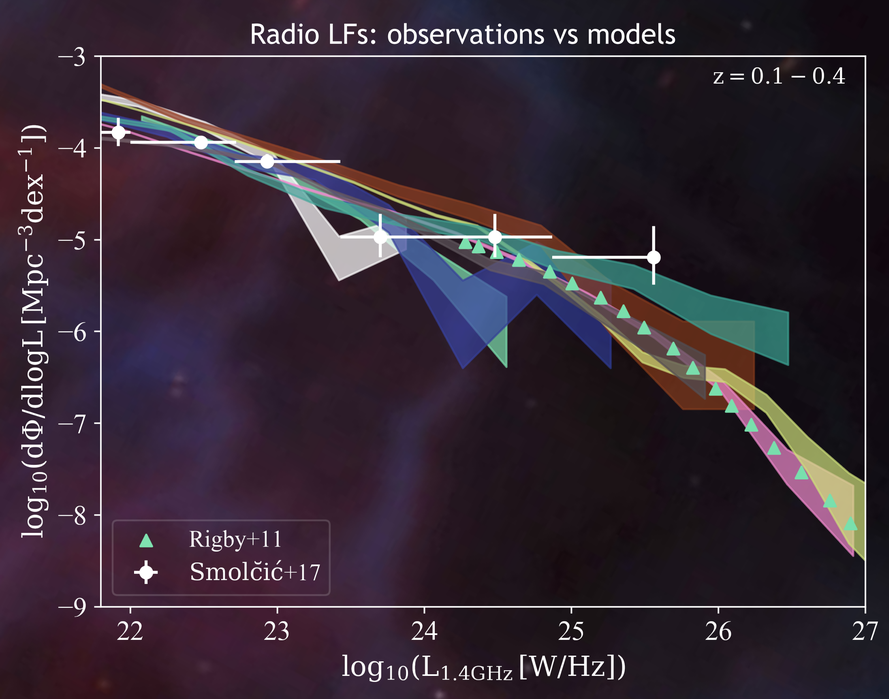
with the future X-ray and radio surveys

Stergios Amarantidis, José Afonso, Israel Matute, Hugo Messias, Rodrigo Carvajal, Davi Barbosa

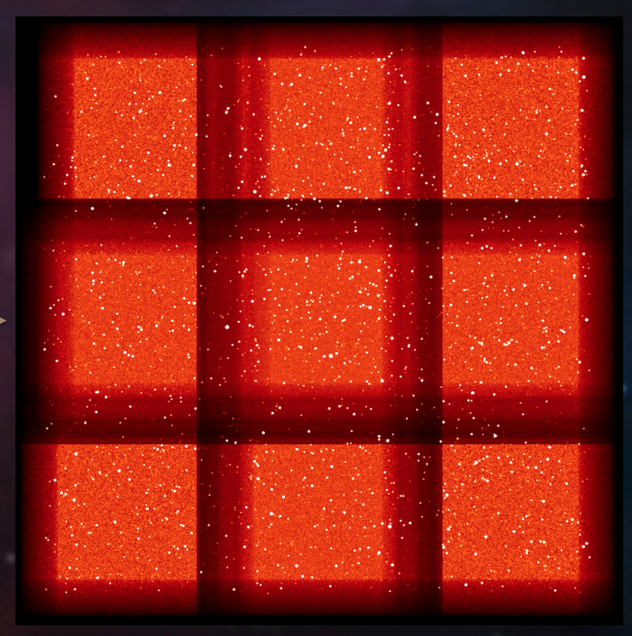
We present an exploration of the expected detection of the earliest Active Galactic Nuclei (AGN) in the Universe from eight state-of-art galaxy formation and evolution semi-analytic models and hydro-dynamical simulations. We estimate the number and radiative characteristics of Super Massive Black Holes (SMBHs) at $z \geq 6$, a redshift range that will be intensively explored by the next generation of telescopes, in particular in the radio through the Square Kilometre Array (SKA) and at high energies with ESA's Athena X-ray Observatory. For the first time we are able to present the SMBH/AGN population at the EoR (derived by cosmological models/simulations) and predict that the next generation of telescopes will observe on average in the X-ray and radio respectively:

Athena → 5000 AGN/deg^2 SKA → 400 AGN/deg^2





We further improve the comparison to observations by modelling such future observations in a much more detailed way, using the technical specifications of the telescope to be employed, joining both a simulated Universe and a simulated instrumental apparatus. We achieve this goal using a simulated survey for Athena, coupling the SImulation of X-ray TElescopes software to one of the models described above. This work shows similar results with the previous methodology



- Motivated by the predictions of the models regarding the AGN population at z>6 we investigate current selection criteria from the literature designed in selecting high-z galaxies
- The first method (a) assumes a single power-law for the radio emission and accepts radio galaxies that have an Ultra-Steep-Spectrum, with a slope of -1. The data in use are derived from the GMRT, ATCA and MWA telescopes. The results present one promising possible high-z radio galaxy (b) to be further explored
- The second method (c) selects radio galaxies that show a peak in their far-IR flux, a method that was successful in the past in selecting star-forming galaxies at z~2-3. For these candidates our team followed spectroscopically 2 radio galaxies with IRAM and ALMA. The results (d) suggest that such selection favours z~2-3 AGN pointing to the use of the mm-peak criterion

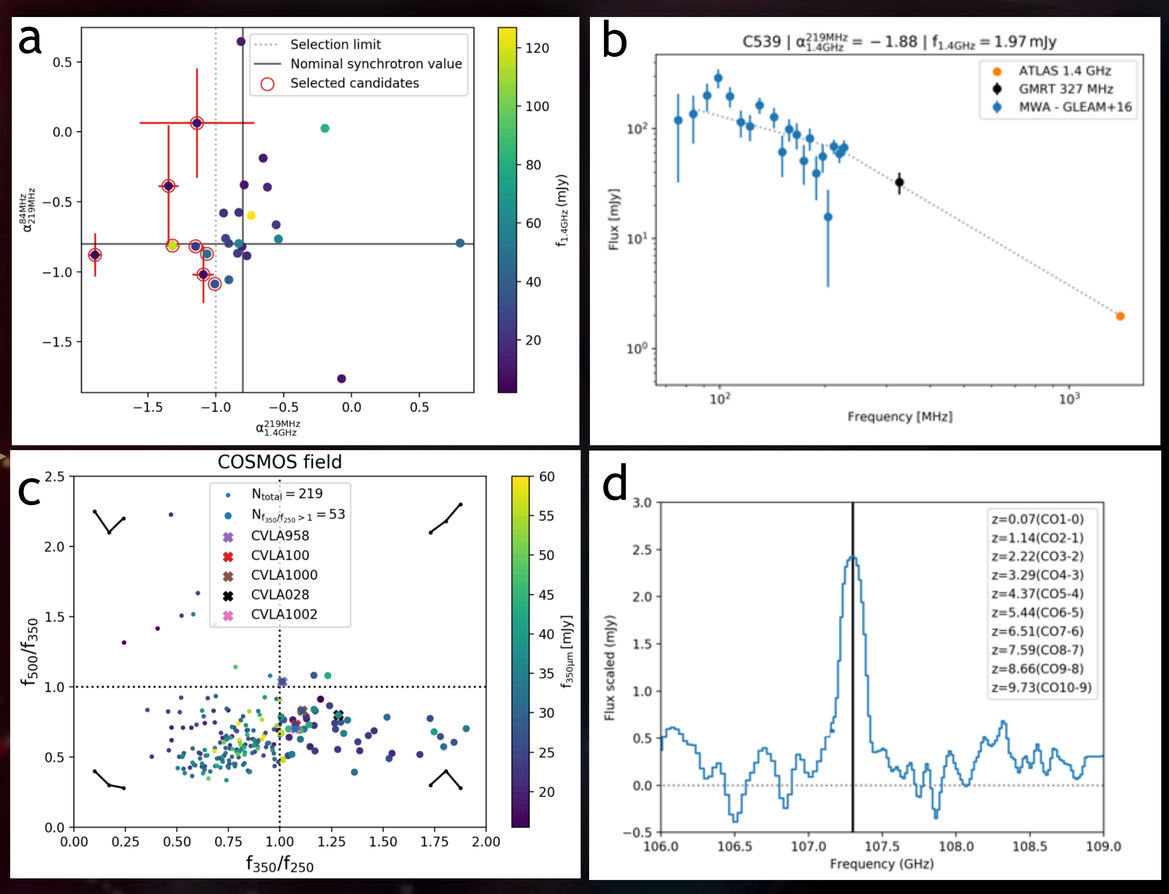


Image Credit: ESO/M. Kornmesser

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