Finding Powerful Radio Galaxies at Their Birth

Radio galaxies occur when the central black hole in a galaxy produces powerful outflows of relativistic particles. These outflows produce synchrotron emission which we observed in the radio regime. This radio emission often outshines the host galaxy and these radio 'jets' are related to the accretion onto the black hole in a complex fashion. In the early stages these outflows are frustrated by the inter-galactic medium within the galaxy and struggle to break out. This frustration causes the radio emission to be absorbed at low-frequencies leading to an empirical relationship between the size of a radio source and the frequency it turns over at. Smaller and younger radio galaxies peak at higher frequencies.

Hence, searching for radio sources which peak at high frequencies can find some of the youngest radio galaxies, but very few of these high frequency peakers are known.

Research Field
Radio Astronomy

Project Suitability
PhD
Honours/Masters

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The aims of this project are:

(i) to use broad-band multi-wavelength radio surveys to create new sample high frequency peakers in both deep (e.g. GLASS) and wide surveys,
(ii) Conduct follow-up radio observations to enable modelling of the radio emission and low-frequency turn-over,
(iii) Using European Southern Observatory facilities measure the properties of the host galaxies inckuding redshift and stellar mass,
(iv) Obtain and analysis VLBI observations of these galaxies to unravel their nature,
(v) Put these sources into the context of radio galaxy evolution to see what process trigger the formation of radio jets.

This project will uniquely exploit the frequency coverage of many Australian radio telescopes such as the ATCA, ASKAP and the Curtin-operated telescopes MWA

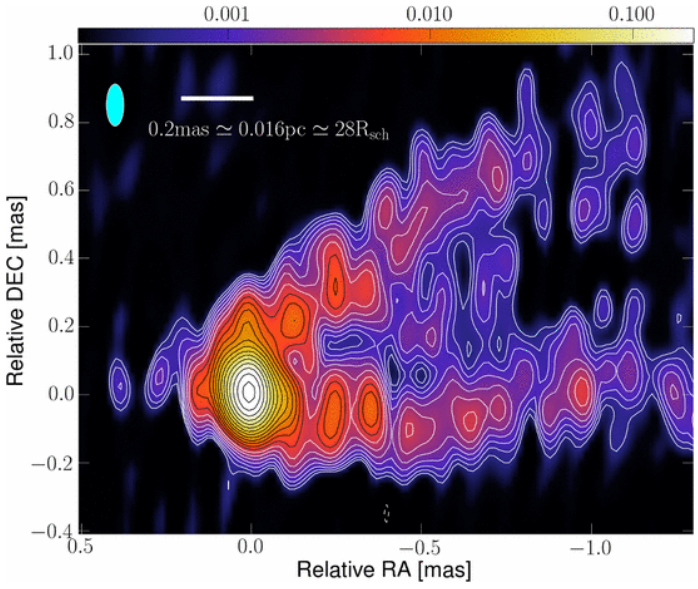

Figure 1: VLBI observations of M 87 at 86 GHz (from Kim et al. 2016,). The image was created after stacking 5 VLBI images taken during 2004–2015.