**Abstract:**

It is now widely recognised that supermassive black holes (SMBHs) of masses ~10^6–10^10 solar mass lurk in the nuclei of almost all massive galaxies. The most spectacular manifestations of such massive black holes in active galactic nuclei (AGN) are the extraordinary energetic bipolar relativistic jets, which form twin-lobed giant radio galaxies on 10^2–10^3 kiloparsec scales, and the extremely luminous quasars. The gravitational accretion of matter onto the SMBH is believed to be the "central engine" that powers them. The physical mechanisms by which the relativistic jets are launched from accretion disks around black holes have long been the subject of intense investigations, yet the issue still remains unresolved despite a wealth of observations. I will present our recent discovery of hundreds of new Giant Radio Galaxies and quasars in which the radio jets are seen to propagate to an unprecedented scale of 1 to 10 Mpc (1 Mpc is 3.26 million light years), and show some extremely rare examples of such Giant Radio Galaxies hosted by black holes in spiral galaxies, instead of ellipticals. I will highlight some puzzling open questions in this field and inform in what way our observations are helping to answer them.