

Probing restarting activity in soft gamma-ray selected giant radio galaxies

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Cross-correlating the INTEGRAL/IBIS - Swift/BAT AGN population with radio catalogs (NVSS, FIRST, SUMSS), we found that 25% of extended radio sources are Giant Radio Galaxies (GRG), i.e. the largest individual objects in the Universe. This fraction is four times more abundant than what found in previous studies. In 2014, we observed a pilot sample of these soft-gamma ray selected GRG at low radio frequencies with the GMRT, with the aim of studying the morphological and spectral properties of these objects. Thanks to these data, we discovered the second X-shaped GRG to date, and a previously unidentified radio galaxy. Another object, observed both at kpc and pc scales (VLBI), showed an extreme jet re-orientation (about 90 degrees). Moreover, the majority of these objects show signs of restarting activity from previous observations in the literature. Given these intriguing premises, we embarked on a radio observing campaign, using both single dish (Effelsberg) and interferometers (VLBA), to probe the lifecycle of these soft gamma-ray selected GRG. The results of this campaign will be presented, that potentially shed light on the origin and evolution of the radio phase for this extreme class of objects (and radio-loud AGN in general), and the connection with high-energy emission. The X-ray properties, and in particular the correlation between the X-ray luminosity of the AGN and the radio luminosity of both the core and the lobes, will be discussed as well.

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