

ABSTRACT OF THE THESIS

submitted by

Tapan Kumar Sasmal, Index No.: 231/18/Phys/26

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“Study of Bent-tail radio galaxies and their correlation with galaxy clusters”

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The Bent-tail (BT) radio galaxy is sub-class of radio galaxies where the primary lobes are being bent in the intercluster weather due to strong interactions between the radio jets and their respective intracluster medium. Based on the bending angle between the two lobes, BT sources are classify in two catagory narrow-angle tail (NAT) and wide-angle tail (WAT). The opening angle between the two lobes for NAT sources is less than 90 degree and for WAT sources it is greater than 90 degree. NAT radio sources are characterized by tails bent in a narrow V-like shape and in the case of WAT radio galaxies are such that the WATs exhibit wide “C-like morphologies.

We systematically search for BT radio galaxies from Very Large Array Faint Images of the Radio Sky at Twenty-Centimeters (VLA FIRST) survey database at 1400 MHz and LOFAR Two-metre Sky Survey First Data Release (LoTSS DR1) at 144 MHz frequency. From FIRST survey, We catalog of 717 new BT sources, among which 287 are NATs and 430 are WATs. Optical counterparts are found for 359 BT sources from FIRST survey. From LoTSS DR1, we found 82 BT sources, among which 10 are NATs and 72 are WATs. The various physical properties and statistical studies like luminosities, spectral index, power etc are also done of these BT sources.

Bent tail (BT) radio sources are radio galaxies which have jets that show a characteristic C, V or L-shape that is believed to be due to ram pressure caused by the motion of the galaxy through the ambient medium. They are generally found in galaxy clusters in the local Universe. They have already been used in observations as tracers of galaxy clusters at redshifts of up to $z \sim 1$. In this work, we also try to find out the correlation between the BT sources and the surrounding medium. We found that 50 out of 82 BT sources are associated with known galaxy clusters from LoTSS DR1. We listed the masses of the known cluster and found cluster masses $M \geq 10^{14.5} M_{\odot}$ contains 34% of BT galaxies while cluster masses $M \leq 10^{14.5} M_{\odot}$ contain 80% of BT galaxies for LoTSS sample.

In this thesis, we also reported nineteen Miscellaneous Radio Sources (MRG), a new morphology of radio sources from FIRST and LoTSS DR1. This type of radio sources differs from other known morphological radio galaxies like FR-I, FR-II double-lobed , Bent-Tail, winged, HYMORS, and DDRG. This peculiar type of radio galaxy are first reported in this thesis.

Soumen Mondal
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Dr. Soumen Mondal
Associate Professor
Department of Physics
Jadavpur University
Kolkata - 700032

Tapan Kumar Sasmal
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