



GMRT observations of the radio source 4C35.06: precessing jets from a cD galaxy under assembly?

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Abstract. We report GMRT observation of the strong radio source 4C 35.06, an extended ($z = 0.047$) radio-loud AGN at the center of galaxy cluster Abell 407. The radio map at 610 MHz reveal a striking, helically twisted jet system emanating from an optically faint AGN host. The radio morphology closely resembles the precessing jets of the galactic microquasar SS433. The optical SDSS images of central region show a complex ensemble of nine galactic condensations within *1 arc minute*, embedded in a faint, diffuse stellar halo. This system presents a unique case for studying the formation of a giant elliptical galaxy (cD) at the cluster center.

Keywords : Galaxies: – radio galaxies – AGN

1. Introduction

The formation of cD galaxies are suggested to be occurring at the centre of rich galaxy clusters in which multiple merger of galactic members take place. The central region of the galaxy cluster Abell 407, is the most convincing and rare example of such a merger in the offing (Schneider et al. 1982). This region, where a conglomeration of nine galaxies shrouded in a stellar halo is a typical case for studying the processes involved in such mergers. In this study we focus mainly on the morphology of the jet from the radio source 4C35.06 hosted by the cluster A407.

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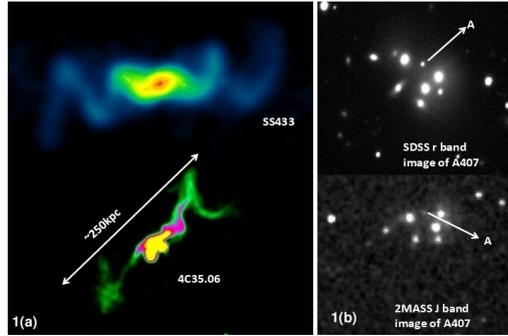


Figure 1. (a) SS433 radio map(top)and 610 MHz radio map of 4C35.06(bottom);(b) The SDSS r band and 2MASS J band images of the central region of A407. The galaxy, marked as A appears as the AGN host.

2. Radio and optical studies of the source 4C35.06

The low frequency maps from GMRT data show extended faint diffuse emission from the jet structure of 4C35.06. The 610 MHz radio map shows a jet with helically twisted morphology and with a size estimate of approximately 250 kpc, closely resembling that of the well known microquasar SS433 (Blundell and Bowler 2004). It points to the fact that the jet is precessing and that the basic processes in jet emission in the stellar scales is the same in galactic scales also(Fig-1(a)). Also there are no hot spots observed in the jet, indicating the continuous shifting of jet direction.

The SDSS and 2MASS images show a faint galaxy coincident with the central region of the radio map with a positional accuracy of $1.5''$ (Fig-1(b)). Since powerful radio jets are observed to emanate only from massive elliptical galaxies, this observation seems to be very unusual. For this low luminous optical host, possibly majority of its stars might have been stripped off during the violent mergers, still retaining a massive black hole at the centre.

3. Results and conclusion

The radio source 4C35.06 hosts a precessing kpc scale jet similar to that of the microquasar SS433. The jet seems to be emanating from the optically faintest galactic member of the cluster A407. This source underscores the paradigm that despite the vast difference in scales, jet phenomena in radio loud AGNs keep a striking similarity with that in microquasars.

References

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