

Ageing and rejuvenation: the tailed radio galaxies in Abell 2142

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Radio galaxies moving through the intra-cluster medium with high velocities experience ram-pressure, which deflects their radio jets and re-shapes them into head-tail galaxies (HTs) typically spanning few hundreds of kpc. Electrons are initially ejected from the head (core), and then progressively age along the tail due to radiative losses. However, recent observations at low (~ 100 MHz) frequencies have unveiled HTs extending on megaparsec-scales and HTs exhibiting sudden flux density enhancements within the tail rather than the expected radial decrease. These observations challenge standard ageing models and imply re-energising mechanisms occurring either in the ICM or within the tail itself. Therefore, HTs offer insights on the re-acceleration mechanisms and the interplay between thermal and non-thermal components in galaxy clusters, and the reservoir of seed (mildly relativistic) electrons in the ICM.

A2142 hosts two intriguing HTs, namely T1 and T2, currently under analysis with deep radio data in the range 50-2000 MHz. T1 is a giant HT extending for 700 kpc and showing localised re-energising features. T2 exhibits a peculiar morphology, with a choked tail culminating in a diffuse filamentary plume; preliminary results suggest that T2 is a dying HT. With our radio and auxiliary X-ray data, we test ageing models, discuss re-energising events, and investigate the role of dynamics and thermodynamics in shaping our targets. We finally speculate on the origin of electrons powering the emission of the 2 Mpc-scale radio halo in A2142.

keywords

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In-person or online?

in-person

Career level

ECR

Primary author: BRUNO, Luca (INAF-IRA, DIFA-UNIBO)

Presenter: BRUNO, Luca (INAF-IRA, DIFA-UNIBO)

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