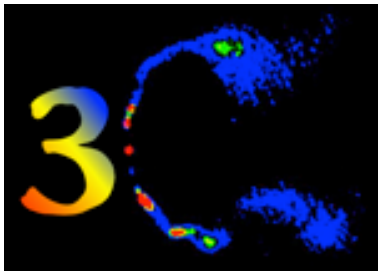

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Stormy weather in 3C 196.1: Nuclear Outbursts and Merger Events Shape the Environment of the Hybrid Radio Galaxy 3C 196.1

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Active galactic nuclei (AGN) feedback have a dramatic impact on cosmic structure formation and evolution, producing the so-called 'cosmic downsizing', the BH-host scaling relations and the quenching of cooling-flows in cluster cores. In particular, radio-loud AGN are expected to experience the most intense galaxy-scale outflows and feedback in the centre of massive galaxies, with jet/intra-cluster medium interaction in the form of cavities (X-ray) and bubbles (radio).
We here present a detailed multi-wavelength analysis based on archival radio (VLA and GMRT), optical (HST) and X-ray (Chandra) data of the hybrid radio galaxy 3C 196.1, whose host is a z=0.198 BCG embedded in a kT ~ 4 keV cluster.
Chandra snapshot observation allowed us to constrain the physical parameters of the cluster, which has a cool core with a low central temperature ~ 2.8 keV, low central entropy ~ 13 keV cm^2 and a short cooling time of ~ 500 Myr, which is < 0.05 of the age of the Universe at this redshift.
3C 196.1 represents an intriguing example of combined effects on the surrounding cluster environment of both AGN activity and merging events.
Indeed, analysis of the X-ray and radio images reveals cavities located at galactic-scale (~ 10 kpc) and in the cluster outskirts (~ 300 kpc, ~ 0.3 R500), originated by previous AGN outbursts ~ 280 Myrs ago, with energetics of ~ 10^59 and ~ 10^60 erg (respectively).
3C 196.1 also harbours one the biggest and highest energetic bubbles ever measured so far and currently multiwavelength observational efforts have been planned to study it in more details.

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