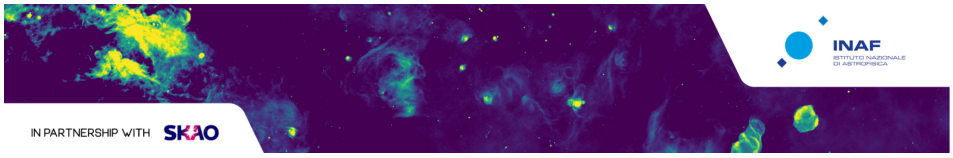

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Non-thermal filaments in galaxy clusters with LOFAR-VLBI (remote talk)

Thursday 27 November 2025 09:00 (15 minutes)

New generations of interferometers are revealing a wealth of spectacular filaments in the surrounding of radio galaxies, mostly residing in group/cluster environment, whose origin is still unknown. Filamentary structures present new opportunities for studying the physical processes in the intracluster medium, including their magnetic structures and the propagation of cosmic rays. Given the steep radio spectra shown by these structures, deep, low-frequencies observations are necessary to detect them. In this talk, I will present the deepest (56 hours) LOFAR-VLBI observations of filaments in the merging galaxy cluster Abell 2255 at 144 MHz. Going down to sub-arcsecond, we detected and resolved for the first time several filamentary structures related to the tailed cluster radio galaxies, characterizing their morphology and emission at unprecedentedly high-resolution. These observations prove the potentiality of LOFAR-VLBI for studying these new emerging radio phenomenon. I will then present high-resolution spectral studies, that were possible combining LOFAR-VLBI data with the higher frequencies ones from uGMRT and VLA. With high-resolution (2-3 kpc), we can disentangle the spectral properties of the filaments to study their nature and the interplay between the radio galaxy and the turbulent cluster environment.
I will discuss several interpretation scenarios regarding the origin of the filamentary emission, and present possible opportunities about the long baselines in SKA-Low.

Topics

Galaxy Clusters & LSS (relativistic particles and magnetic fields)

Author: DE RUBEIS, Emanuele (Istituto Nazionale di Astrofisica (INAF))

Presenter: DE RUBEIS, Emanuele (Istituto Nazionale di Astrofisica (INAF))

Session Classification: Galaxy clusters & LSS