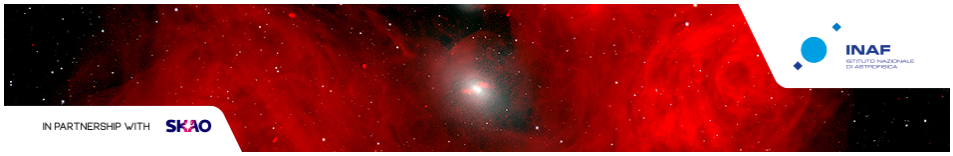

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An ILT view of radio galaxies in Abell 2255: a scientific and technical challenge towards the SKA era

Wednesday, 29 November 2023 12:30 (20 minutes)

The LOw Frequency Array (LOFAR) is an interferometer that operates at frequencies between 10 and 240 MHz. The facility consists of 52 stations. 14 "international"stations are spread throughout Europe: they provide baselines of up to 1989 km, which yields an angular resolution of 0.27"at 150 MHz. Using the full International LOFAR Telescope (ILT) is however technically challenging in terms of both calibration and data volumes: these difficulties caused the ILT to be not intensively used in the previous years, and so just a small number of publications was produced.
The turning point is represented by the development of a pipeline by Morabito et al. (2022) which allows the calibration and imaging of targets within LOFAR's field of view at sub-arcsecond resolution.

I will show the results from the ILT observations of the galaxy cluster Abell 2255. In particular, the main focus is on the "tails"of the four main radio galaxies that characterize the cluster environment, namely the "Original Tailed Radio Galaxy (Original TRG)", the "Goldfish", the "Beaver", and the "Embryo".
These head-tails show extended synchrotron radio emission on 100s kpc-Mpc scales at 144 MHz up to resolutions of 5.0"x 3.8"(Botteon et al., 2020). But, at this moment, no LOFAR-VLBI observations at sub-arcsecond resolution have been performed for these radio galaxies to study their interplay with the merging cluster environment and try to reveal the nature of their filamentary structure. Particular attention is given on the data handling, that represent a crucial point for the correct exploitation of the "international stations"(IS), as well as an important testing ground for the future SKA infrastructure.

The goal of this work is then to use LOFAR long-baselines data to study the structure of the main tails observed in A2255. These preliminary results have been obtained with just a small number of observations (64 hours at the moment) with respect to the huge amount of data that will be available and will be put together (around 250h of observations) in the following months, with the aim to show a unique view of these sources at arcsecond and sub-arcsecond resolution.

Reasearch area

Extragalactic Continuum (galaxies/AGN, galaxy clusters)

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