ALMA MATER STUDIORUM
UNIVERSITÀ DI BOLOGNA

DIPARTIMENTO DI FISICA E ASTRONOMIA
Department of Physics and Astronomy - DIFA

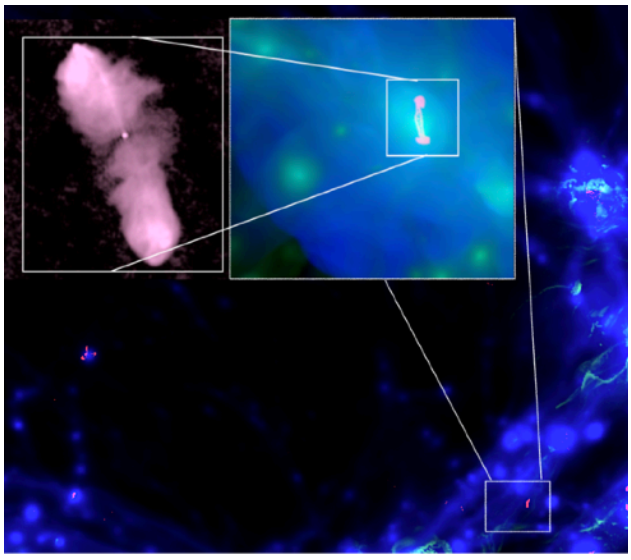
Post Doctoral Fellowship in ASTROPHYSICS

Title of the Project:
"The impact of old radio plasma from Active Galactic Nuclei on the non-thermal energy of galaxy clusters"

Supervisor : Prof. F. Vazza (DIFA)

Scientific Case: Radio Galaxies are one of the most spectacular example of how astrophysics couples spatial and temporal scales separated by many orders of magnitude, and they also are a key ingredient of galaxy formation.
The long-term evolution of relativistic plasmas, injected by radiogalaxies over their evolution and mixing with the surrounding gas, depends on a complex sequence of loss and re-energisation events, which can efficiently detected and studied by low-frequency radio observations. This can also shed light on still poorly understood diffuse re-acceleration processes acting in the gas of large-scale structures.

Outline of the Project: Low frequency radio observations are the most powerful tool presently at our disposal to study the ageing process of radio plasmas in the intracluster medium. In particular, LOFAR (HBA or LBA) observations presently offer the best compromise between spatial resolution, sky coverage and spectral energy resolution to study the whole phenomenology of fossil radio plasmas ejected radio galaxies, by opening rather unexplored territory in the low-surface brightness and steep-spectrum regime of radio emission typical of "fossil" relativistic electrons.
The optimal candidate for this project is a young yet experienced researcher in the investigation of radiogalaxies using LOFAR, with a strong record on the observational study of fossil radiogalaxies and in their theoretical modelling using existing modelling algorithms.



Development and formative plan The Post-Doctoral fellow will be involved in all existing scientific activities and lines of research of the MAGCOW group (https://cosmosimfrazza.myfreesites.net/erc-magcow). He/she will have access to all numerical method and physical models developed by the group, which will be helpful to model the ageing and re-acceleration of fossil plasmas in complex objects.
The Post-Doctoral fellow will have the opportunity to lead this line of research, by coordinating specific observing campaigns tailored to identify interesting and peculiar diffuse radio sources linked to ageing lobes of radiogalaxies.
The candidate will be encouraged to keep all existing collaborations alive, to present new results to conferences and workshops, as well as to perform any possible outreach activity to maximise the project's impact on the general public.

Given its topic and workflow, this project calls for candidates with documented experience in the observation and analysis of old plasmas from radio galaxies in large radio survey data.

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