

Radio-X study of CHEX-MATE radio halo clusters

Wednesday, 8 May 2024 14:40 (15 minutes)

In this talk, I will present the first homogeneous X-ray and radio study of galaxy clusters using LOFAR, MeerKAT and CHEX-MATE XMM observations.

Past studies have shown the presence of radio-X-ray connections in galaxy clusters and used them to derive constraints on cluster energetics and particle (re-)acceleration. However, many aspects of these processes are yet to be understood. With the advent of new radio facilities at low frequencies, robust spatially resolved analyses on clusters are becoming available, providing new crucial information about different acceleration models.

As a first step of a wider systematical study, we analyzed a sample of clusters hosting radio halos, 18 observed by LoTSS and 6 in L-band by MeerKAT, drawn from the CHEX-MATE project.

I find strong correlations between X-ray and radio brightness in every target. This relation is (almost) always sub-linear, at both high and low frequencies, indicating a flatter distribution of the non-thermal component. In addition, by studying the varying radio-X relation found, for a few objects I was able to test a simplified re-acceleration model and to put constraints on some of its parameters.

Finally, for the 18 LOFAR targets, I will also present preliminary results of a tentative radio profile rescaling, as usually made for the thermal component of the ICM, searching for a universality of the halos radial profile. In these years, a growing number of works are showing the potential of radio and X-ray synergies in galaxy cluster studies. The homogenous observations of large samples of clusters ensured by future, deep, large surveys, such as the one made with SKA, will provide the necessary data to perform statistical and systematic analyses of these objects.

keywords

clusters, radio-X relation

In-person or online?

in-person

Career level

Student

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