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A multi-scale low radio frequency view of the Perseus cluster

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Among the most notorious sources belonging to the Third Cambridge Catalogue is 3C84, active galactic nuclei of NGC 1275, the Perseus cluster's brightest galaxy. It is the origin of a complex interaction between radio jets and the cluster's environment, releasing relativistic particles on large distances. On the other hand, the hierarchical merging of subclusters and groups, from which cluster originate, also generates perturbations into the intracluster medium through shocks and turbulence, constituting a potential source of reacceleration for these particles. In this talk, I will present deep multi-scale low radio frequency (230-470 MHz) observations of the Perseus cluster from the Karl G. Jansky Very Large Array, probing the non-thermal emission from the old particle population of the AGN outflows. Our observations of this nearby relaxed cool core cluster have revealed a multitude of new structures associated with the radio lobes and the mini-halo, which extends on hundreds of kpc in size. The irregular morphology of the mini-halo seems to have been influenced both by the AGN activity and by the sloshing motion of the cluster's gas. In addition, it has a filamentary structure similar to that seen in radio relics found in merging clusters. Furthermore, the Perseus cluster hosts several interesting head-tail radio galaxies (NGC 1265, NGC 1272, IC310 and CR 15) on which I will also present an analysis of the morphology and spectral index distribution.

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