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Mapping the intracluster medium temperature in the era of NIKA2 and MUSTANG-2

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Up until recently, mapping the temperature of the intracluster medium (ICM) required high signal-to-noise observations in the X-ray domain to fit spectra extracted from several independent regions of the ICM. However, as the exploration of cluster formation extends to high redshifts, the cost of these observations becomes prohibitive. It is therefore essential to develop new procedures to characterize temperature fluctuations within the ICM at high redshift. In this context, high angular resolution SZ observations have a major role to play. Because of their respective dependence on the density and pressure of the ICM, the combination of X-ray and SZ observations allows us to map the temperature of the ICM without having to consider spectral information in X-ray data. With both a wide field of view and a high angular resolution, NIKA2 and MUSTANG-2 are very well suited instrument to map the SZ signal of high redshift clusters up to R_{500}. Moreover, they cover different frequency bands that can be exploited to estimate the different components of the SZ effect. Among them, the rSZ effect directly depends on the ICM temperature. Thus, the 2020 decade ushers in a new era for the characterization of high redshift clusters in which all thermodynamic properties of the ICM, including temperature, can be estimated via SZ observations alone.

I will present recent results from two independent open time programs conducted with NIKA2 at the IRAM 30-m telescope. The first one takes advantage of the complementary of X-ray and SZ observations to map the ICM temperature of IR-detected galaxy clusters at z > 1 using *Chandra* and NIKA2 data. The second one intends to perform the first ICM temperature mapping based on the resolved detection of the rSZ effect in the massive cluster RXJ J1347−1145 from the combination of NIKA2 and MUSTANG-2 data.

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