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ComPACT: Combined ACT+Planck galaxy cluster catalogue

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Galaxy clusters are the most massive gravitationally bound systems consisting of dark matter, hot baryonic gas and stars. They play an important role in observational cosmology and galaxy evolution studies. We develop a deep learning model for segmentation of Sunyaev-Zeldovich (SZ) signal on ACT+Planck intensity maps and construct a pipeline for microwave cluster detection in the ACT footprint. The proposed model allows us to identify previously unknown galaxy clusters, i.e. it is capable of detecting SZ sources below the detection threshold adopted in the published galaxy clusters catalogues (such as ACT DR5 and PSZ2). In this paper, we use the derived SZ signal map to considerably improve a cluster purity in the extended catalogue of Sunyaev-Zeldovich objects from Planck data (SZcat) in the ACT footprint. From SZcat, we create a new microwave galaxy cluster catalogue (ComPACT), which includes 2,962 SZ objects with cluster purity conservatively estimated as ≈ 74 -84 per cent. We categorise objects in the catalogue into 3 categories, based on their cluster reliability. Within the ComPACT catalogue, there are ≈ 977 new clusters with respect to the ACT DR5 and PSZ2 catalogues.

nasa.ads: <https://ui.adsabs.harvard.edu/abs/2024MNRAS.tmp.1272V/abstract>

Primary author: VOSKRESENSKAIA, Svetlana (Higher School of Economics (HSE))

Co-authors: Mr MESHCHERYAKOV, Alex (Space Research Institute Russian Academy of Science); Mrs LYSKOVA, Natalya (Space Research Institute Russian Academy of Science)

Presenter: VOSKRESENSKAIA, Svetlana (Higher School of Economics (HSE))

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