

Scaling relations in clusters and proto-clusters at $z > 1.5$

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We present recent results on the persistence of the morphology-density relation in clusters and proto-clusters at $z > 1.5$, and the environmental effects on their mass-size relation (Afanasiev et al. 2023, Mei et al. 2023). Our clusters and protoclusters were detected as overdensities around radio-loud AGN at $z > 1.5$ from the CARLA (Clusters Around Radio-Loud AGN; Wylezalek et al. 2013, 2014) survey, and confirmed with HST grisms spectroscopy (Noirot et al. 2016, 2018). The CARLA sample includes progenitors of the present-day clusters and proto-clusters at $z > 1.5$ that are still in the process of assembling.