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Galaxy Clusters & AGN Feedback: The Clusters Hiding in Plain Sight (CHiPS) Survey

Clusters of galaxies are the largest gravitationally bound objects in the universe, consisting of hundreds of galaxies. However, both theoretical calculations and simulations tend to predict too much cool gas and too many newborn stars. This is referred to as "the cooling flow problem", and the best candidate for explaining this discrepancy is feedback by the central active galactic nucleus (AGN)–a bright and compact region at the center of a galaxy. Even though most of the clusters show a signature of a powerful jet in the center (kinetic-mode feedback), only a few clusters have extremely-bright AGNs in their central galaxies (quasar-mode feedback).

In this talk, I will present the Cluster Hiding in Plain Sight (CHiPS) survey with the goal to search for new galaxy clusters surrounding X-ray-bright point sources. The CHiPS survey has resulted in several new clusters which are massive enough to be detected with other galaxy cluster catalogs. This includes CHIPS01–a typical cool-core cluster surrounding PKS1353-341 with M500˜ 7x10ˆ7 Msun and CHIPS1911+4455–a galaxy cluster with large star formation rates in the center. By performing a detailed study of these objects, we can investigate the impact a central quasar has on the intracluster medium and demonstrate the potential of the CHiPS survey to find massive nearby clusters with extreme central properties that may have been misidentified by previous surveys.

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