X46a Detection of the anisotropic satellite galaxy quenching in clusters up to $z \sim 1$

Makoto Ando, Kazuhiro Shimasaku, Kei Ito, Takumi Tanaka, John D. Silverman, Suin Matsui (U.Tokyo), HSC Project 439 member

Satellite galaxies in the cluster environment are more likely to be quenched than galaxies in the general field through various physical mechanisms, e.g. ram pressure stripping, interaction and preprocessing. Recently, it has been reported that at $z < 0.1$, satellite galaxy quenching depends on the orientation relative to their central galaxies: satellites along the major axis of centrals are more likely to be quenched than those along the minor axis. This phenomenon, called "anisotropic quenching", may provide clues to understanding how the cluster environment quenches satellites. However, there are too few studies to conclude its physical origins, and there are no conclusive detections of anisotropy at $z > 0.1$. This study aims to reveal whether anisotropic quenching is universal in the higher-z universe up to $z \sim 1$ and tackle its physical origins.

We use the latest version of the CAMIRA cluster catalog (Oguri et al. 2018), a large optically-selected cluster catalog derived from the Hyper Suprime-Cam Subaru Strategic Program. We calculate the quiescent satellite galaxy fraction as a function of orientation angle measured from the major axis of the central galaxies and find that the derived quiescent fraction at $0.25 < z < 1$ is reasonably fitted by the sinusoidal function, suggesting the existence of anisotropic quenching up $z \sim 1$. We also find that the satellites are preferentially distributed along the major axis, implying the connection to the large-scale structure. Based on these results, we will discuss the physical origins of the detected anisotropy.