X49a Crimson Behemoth: $z \sim 5$ massive clumpy galaxy hosting X-ray dusty AGN

Takumi Tanaka (U.Tokyo/Kavli IPMU), John D. Silverman (Kavli IPMU), Masafusa Onoue (Kavli IPMU), Yurina Nakazato (U.Tokyo), Andreas L. Faisst (Caltech/IPAC), Xuheng Ding (Wuhan U.), Zhaoxuan Liu (Kavli IPMU), Kazuhiro Shimasaku (U.Tokyo), and the COSMOS-Web team

Deep imaging and spectroscopic observations by *JWST* have discovered a large number of high-z, red, and compact objects, dubbed "little red dots" (LRDs). Based on the detection and analysis of broad emission lines, previous studies have argued that LRDs are low-luminosity AGNs hosting overmassive black holes. However, previous LRD selections are mainly based on color and compactness criteria, possibly biasing towards AGN-dominant, host-galaxy-undetected "dots". To search for LRDs with extended host galaxy components, we apply a pixel-by-pixel color selection to the COSMOS-Web *JWST*/NIRCam images. To reliably select high-z AGNs, we cross-match the selected sources with *Chandra* X-ray and *Keck-II*/DEIMOS spectroscopic catalogs, discovering an object at $z_{\rm spec} \sim 4.9$ with a red core and a massive ($M_* \sim 10^{11} M_\odot$) clumpy structure. The red core has a similar color to spectroscopically confirmed LRDs, suggesting it is a dusty AGN. Each clump has SFR and M_* comparable to $z \gtrsim 5$ Lyman-break galaxies but is more compact, indicating higher SFR and M_* densities. Comparison with a similar system in zoom-in simulations suggest a clump formation through violent disk instabilities. These uniquenesses make this system an unprecedented test case for discussing the evolution of the SMBH-galaxy relation during the high-z dusty evolutional stage transitioning into unobscured quasars. In this presentation, we will report the anaysis results from the COSMOS-Web imaging data.