Dark Matter Halo Mass--Stellar Mass Relation of Active Galactic Nuclei from Galaxy-Galaxy Lensing with HSC Subaru Strategic Program

○Di HE[1, 2] John Silverman[1, 2] Surhud More[4] Andy Goulding[3] Wentao Luo[5, 6] (1.Institute for the Physics and Mathematics of the Universe (Kavli IPMU, WPI), UTIAS, Tokyo Institutes for Advanced Study, University of Tokyo, Chiba 277-8583, Japan 2.Department of Astronomy, School of Science, The University of Tokyo, 7-3-1 Hongo, Bunkyo, Tokyo 113-0033, Japan 3.Department of Astrophysical Sciences, Princeton University, Princeton, NJ 08544, USA 4.Inter-University Centre for Astronomy and Astrophysics, Pune, Maharashtra 411007, India 5.Hefei Institute of Technology, Hefei, Anhui, P.R.China 6.Department of Astronomy, University of Science and Technology of China, Hefei, Anhui, 230026, P.R.China)

We measure the dark matter halo profile of active galactic nuclei(AGNs) in the redshift range of $0.2\le z \le 0.8$, utilizing galaxy--galaxy lensing method with data from the Hyper Suprime-Cam Subaru Strategic Program (HSC-SSP) Year 3 release. We measure the weak lensing signal of totally 157,372 AGNs, and inspect the dependence of lensing signal on stellar mass, AGN luminosity, and AGN type (Type I versus Type II). By modeling the signal using a halo occupation distribution (HOD) framework, we find a typical halo mass $\log [M_h / h^{-1}M_\odot] = 11.78_{-0.03}^{+0.03}$ and satellite fraction $f_{\rm sat} = 0.22_{-0.01}^{+0.01} $ for our AGN sample. We present the dark matter halo mass--stellar mass (M_h--M_*) relation of AGNs in comparison with HSC galaxy sample. In contrast to normal galaxies, AGNs show a more moderate increase in the M_h--M_* relation, suggesting a preference of host halo mass ranges around $11.6 \sim 12.0 \, h^{-1}M_\odot$ for AGNs. Furthermore, we find that AGN luminosity has no significant impact on the halo profile. Regarding the differences between Type I and Type II AGNs, we find that Type II AGNs tend to exhibit a higher satellite fraction and a larger proportion of off-centered systems. This may suggest that obscured AGNs are more likely to reside in off-centered dark matter halos.