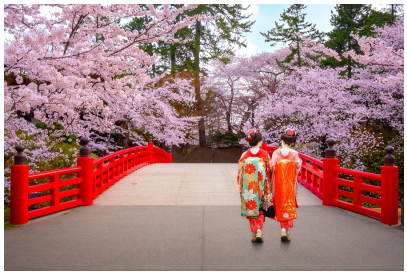

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The average SMBH accretion properties of star-forming galaxies and their cosmic evolution over 4≤z≤7.

There is a positive correlation between the mass of SMBHs ($M_{\rm BH}$) and the stellar mass of their host galaxies ($M_{\rm star}$) in the local Universe, suggesting that SMBHs and galaxies have co-evolved. Studying distant galaxies is vital to understand the co-evolution process. Although it is difficult to measure $M_{\rm BH}$ in distant galaxies except for quasars, its time derivative, $dM_{\rm BH}/dt$ (black hole accretion rate: BHAR), is relatively easily obtained from X-ray observations. For many galaxies without individual X-ray detection, an average BHAR (<BHAR>) can be obtained by stacking X-ray images. However, there are few studies of accretion properties for galaxies beyond $z \sim 4$.

In this study, we examine the average accretion properties of about 12,000 Lyman break galaxies at 4 ≤ z ≤ 7 in the COSMOS field from the Hyper Suprime-Cam Subaru Strategic Program, where the deep X-ray image of the Chandra Legacy Survey is available. We constrain the <BHAR> for UV-magnitude-binned subsamples by X-ray stacking. We find that both <BHAR>/<SFR> and <BHAR>/<HAR> (average halo accretion rate) are much lower than the corresponding mass ratios ($M_{\rm BH}/M_{\rm star}$ and $M_{\rm BH}/M_{\rm h}$) of local galaxies. We also compare the results with quasars' accretion properties and cosmological simulations.

Auteur principal: MATSUI, Suin (The University of Tokyo)

Co-auteurs: Prof. SHIMASAKU, Kazuhiro (The University of Tokyo); M. TANAKA, Takumi (The University of Tokyo)

Orateur: MATSUI, Suin (The University of Tokyo)

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