Testing the coevolution of black holes and massive host galaxies to z=1.5

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Scientific Category: AGN/QUASARS

Scientific Keywords: BLACK HOLES, HOST GALAXIES, AGN PHYSICS

Total Budget Amount: $56,500

Abstract

Investigating the nature of the black hole-galaxy connection is essential for understanding galaxy formation and evolution. We propose to test co-evolutionary models by studying the scaling relations between black hole mass and stellar velocity dispersion (sigma; BHS) or luminosity (BHL) out to z=1.5. To this aim, we will perform two complementary investigations combining black hole masses of broad-line quasars (from ground-based spectroscopy) with their host galaxy properties (from HST images). On the one hand, for all 32 luminous quasars with massive host galaxies at z~0.4 in the HST archive, we will measure effective radius and surface brightness. This will provide an estimate of sigma via the Fundamental Plane (FP) correlation, and thus the BHS relation. The nuclei of these objects are too bright to measure sigma directly and therefore this methodology is required to extend the BHS to black-hole masses above 10^9 solar masses. In combination with our direct determination at smaller masses this study will be used to investigate mass dependent evolution. On the other hand, at higher redshift (out to 1.5) -- where it is not known if the hosts of bright QSOs obey the FP -- we will determine the BHL relation by measuring luminosities for a sample of 75 broad-line AGNs selected from GOODS-N/S fields.

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