



PHYSICS AND ASTRONOMY SEMINAR

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“Towards an Understanding of the Black Hole Mass Scaling Relations”

Abstract

The discovery of close correlations between supermassive BHs and their host-galaxy properties has sparked a flood of observational studies pertaining both to the local Universe and cosmic history over the last decade. Nevertheless, a clear understanding of their origin still eludes us. Uncertainty remains as to the fundamental driver of these relations, whether purely local and baryonic or global and dark matter dominated. While studying the evolution of these relations with cosmic time provides valuable clues, a definitive resolution of this conundrum relies on understanding slope and scatter of local relations for AGNs. We discuss results from a unique three-fold approach. (i) From a sample of ~ 100 AGNs in the local Universe, we build a robust baseline of the BH mass scaling relations (MBH-sigma, MBH-L, MBH-M), combining spatially-resolved Keck spectroscopy with SDSS imaging. (ii) We study the evolution of the MBH-sigma and MBH-L relations out to a look-back time of 4-6 Gyrs using Keck spectra and HST images. (iii) We extend this study out to the pivotal cosmic time between the peak of AGN activity and the establishment of the present-day Hubble sequence, a look-back time of 8-10 Gyrs. We measure spheroid stellar masses using deep multi-color HST images from GOODS and determine the MBH-M relation. The results (i) indicate that AGNs follow the same scaling relations as inactive galaxies. From (ii-iii) we conclude that BH growth precedes bulge assembly. Combining results from (i-iii) allows us to test the hypothesis that evolution is driven by disks being transformed into bulges.

Wednesday, May 20, 2015

2:00 p.m.

Elliott Building

Room 162