SACRAMENTO STATE

Department of Physics and Astronomy

SPRING 2020 Colloquium Series

"Mapping Active Galactic Nuclei Using Light Echoes"

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The obscuring circumnuclear torus of dusty molecular gas is one of the major components of AGN (active galactic nuclei), yet the details of its size, composition, and structure have not been well constrained. These properties can be studied by analyzing the temporal variations of the infrared (IR) dust emission from the torus in response to variations in the AGN continuum luminosity; a technique known as reverberation mapping. To help extract the structural information embedded in the IR response a dust reverberation mapping code, TORMAC, was developed to simulate the temporal response of the torus dust emission given an input optical light curve. This code was used to quantify the relationship between the lag and the effective size of the dust emitting region at selected IR wavelengths. Although the shape of the response varies widely with the torus parameters, the reverberation lag provides an estimate of the effective torus radius that is always within a factor of 2.5. This result and the observed tight correlation of dust reverberation time lags with AGN luminosity, $\tau \propto L^{0.5}_{AGN}$, shows that we can use AGN as a cosmological standard candle. This is the goal of the VISTA Extragalactic Infrared Legacy Survey (VEILS) which is currently monitoring about 500 AGN in the optical and near-IR for 4 years. Modeling the VEILS light curves with TORMAC will enable the first systematic studies of the torus properties over wide ranges in AGN luminosity and redshift. Also, given that upcoming time domain surveys will vastly expand the sample of AGN reverberation mapping data, I will discuss my future plans to add upgrades to this versatile modeling tool to maximize the science that can be extracted from these data sets.

***Tuesday, March 10, 2020**
4:00 – 5:20PM
MENDOCINO HALL 1015

Open & Free to all students, faculty and public