The Biggest Blowhards: Windy Supermassive Black Holes

Supermassive black holes reside in the centers of every massive galaxy. In relatively brief spurts, black holes grow as luminous quasars through the infall of material through an accretion disk. Remarkably, the light from the accretion disk can outshine all of the stars in the host galaxy by a factor of a thousand, and this radiation can also drive energetic mass outflows. Mass ejection in the form of winds or jets appears to be as fundamental to quasar activity as accretion, and can be directly observed in many objects with broadened and blue-shifted UV emission and absorption features. A convincing argument for radiation pressure driving this ionized outflow can be made. Applying unsupervised and hierarchical clustering algorithms on quasar spectra, we can match windy quasars with specific emission-line properties sensitive to the shape of the ionizing continuum. Beyond the dust sublimation radius, radiation pressure is still important, but high energy photons from the central engine can now push on dust grains. This physics underlies the dusty wind picture for the putative obscuring torus. I'll describe our model of the dusty wind and evaluate its successes and shortcomings in accounting for observed properties of quasars such their mid-infrared power, fractions of hidden objects, and column densities of important ions.