

Are All Active Galactic Nuclei Born Equal?

The Silicate Dust Mineralogy Perspective

Aigen Li & Melanie Köhler (*University of Missouri*)

Dust is the cornerstone of the unification theory of AGNs. This theory proposes that all AGNs are essentially the same object or "born equal" but viewed from different lines of sight and suffered different amount of dust obscuration. It is this crucial role played by dust in the unified model of AGNs that makes understanding dust properties very important in understanding AGNs. Little is known about the dust in the circumnuclear torus of AGNs. There is evidence suggesting that the size and composition of the dust in AGNs may differ substantially from that of the Galactic interstellar dust, as reflected by the flat/"gray" or steep, SMC-like extinction, and the anomalous silicate emission or absorption features observed respectively in type 1 and type 2 AGNs. The silicate feature profiles of AGNs are rather diverse in peak wavelengths, widths, strengths, and band ratios of the $18\text{ }\mu\text{m}$ O--Si--O feature to the $9.7\text{ }\mu\text{m}$ Si--O feature, suggesting that the AGN silicate grains were probably not "born equal". We report our recent studies on dust in AGNs, with special attention paid to the silicate mineralogy. We place constraints on the silicate composition and size by modeling the Spitzer IRS spectra of AGNs of various types, using a simple plane-parallel slab radiative transfer method. We examine whether (and how) the silicate composition and size properties vary with the properties of an AGN (e.g. type, luminosity).