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Dust formation and survival in Quasars

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Infrared observations of AGN reveal the emission from a dusty circumnuclear “torus” that is heated up by radiation from the central accreting black hole (BH). The strong 9.7 and 18 micron silicate features observed in the AGN spectra both in emission and absorption, further indicate the presence of such dusty environment. The origin of this dust is presently unclear. It could be pre-existing dust that streamed from the surrounding medium into the accretion disk or, it could be dust that has newly- formed in the environment surrounding the active BH.
The environment of a quasar is often assumed to be too hostile to support the necessary chemical processes leading to the formation of cosmic dust. In this talk, I will present the results of our study based on the formation and survival mechanism of newly formed, as well as pre-existing dust, in the winds blown off the accretion disks, which has been proposed to constitute the AGN ‘’tori”. The study takes into account the series of physical and chemical processes relevant to the environment, such as: a) the radiation transport from the central source through the surrounding medium, b) the formation of dust seed-nuclei from gas phase metals, c) the growth of dust grains through accretion and coagulation, and d) the radiative and collisional heating of the dust grains. We compare the timescales associated to these mechanisms to the flow time of the winds, identifying the “bottle-necks” to the formation of dust in the AGN environment.
The model enables us to estimate the dust production rate in quasars and to quantify their relative contribution as dust producers in the galaxies and in the intergalactic medium. Further, we study the interaction of the X-ray and UV-optical from the accretion disk with the ambient dusty winds and calculate the emerging X-ray, UVO and IR spectra from the AGNs as a function of the quasar viewing angle.

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Yes

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