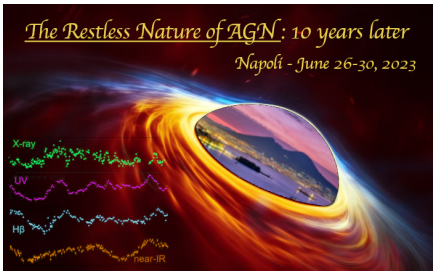

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To the Torus and beyond: A multi-epoch study of obscuration in nearby AGN

Active galactic nuclei (AGN) are powered by accreting supermassive black holes, surrounded by a torus of obscuring material. The exact geometry of this material has been a subject of debate, as models have advanced from the initial homogeneous torus to a variety of possibilities, ranging from cloud distributions, to warped disks, to outflows. Recent studies have shown how the torus structure, formerly thought to be homogeneous, appears to be 'patchy': the detection of variability in the line-of-sight (los) hydrogen column density (NH_{los}), in fact, matches the description of an obscurer with a more complex structure made of clouds with different density. X-ray observations are the only way to probe the obscuring column density in the line of sight at any given time, and thus the optimal tool to place constraints on the exact distribution of this material.

In this work, we present a multiepoch X-ray analysis of 25 local obscured AGN, including a total of 131 X-ray observations, spanning more than 20 yrs of observing time. Surprisingly, we observe large differences between l.o.s. column densities and average torus column densities for most sources. In some of the sources, the addition of an "inner" ring of denser material (NH>10^{25}cm^{-2}) is required to properly model the reflection component of the spectra. This suggests that the material responsible for obscuration and reflection is not the same, pointing toward added complexities in the torus structure. We also conclude that variable sources tend to have higher obscuration in average (i.e. denser tori), and broader cloud distributions.

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