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Resolved Mid-Infrared Imaging of AGN: An Isotropic Measure of Intrinsic Power

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We present a strong correlation between 12 μm mid-IR and intrinsic X-ray (2–10 keV) luminosities of local Seyferts. This work is based on new diffraction-limited mid-IR observations with the 8-m Very Large Telescope (VLT), resulting in the least-contaminated core fluxes of 42 Seyferts to date. Unobscured, obscured and Compton-thick sources all closely follow the same correlation,

$$L_{\rm MIR} \propto L_{\rm X\text{-}ray}^{1.11\pm0.07},$$

which is tight enough to significantly constrain any residual star-formation within $\sim$ 70 pc of the unresolved cores of active galactic nuclei (AGN). The mean 2 keV to 12.3 μm AGN spectral index is found to be $\alpha_{\rm IX} = -1.10 \pm 0.01$, largely independent of luminosity. The observed 12 μm bolometric corrections range between $\sim$10 and $\sim$30 if a known luminosity trend of intrinsic X-ray bolometric corrections is assumed. Comparison with *Infrared Space Observatory (ISO)* data spanning a larger luminosity range suggests that our correlation can be extended into the quasar regime. Uncontaminated mid-IR continuum imaging is thus found to be an accurate proxy for the intrinsic power of an AGN, and we discuss the resulting implications for smooth and clumpy dust tori models as well as searches for any underlying non-thermal infrared emission components.

References

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