High resolution IR observations of X-ray obscured AGN

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Herschel has recently discovered sources showing unambiguous evidence for the presence of a powerful, buried AGN from several panchromatic diagnostics of nuclear activity (i.e. mid-IR colour-colour selection, power-law Spectral Energy Distribution, [NeV] line in the optical and mid-IR spectra, radio excess) that are not detected in X-rays (even in the deepest exposures). Given the amount of obscuration required to prevent the expected X-ray luminosity to be observed (gas column density, Nh, exceeding 10^24 cm-2), these sources are likely the Compton Thick AGN predicted by AGN synthesis models for the Cosmic X-ray Background (i.e. Gilli et al. 2007).

The only way to measure the molecular gas mass, its size and spatially resolve the gas column density (verifying whether the host gas density in the nuclear region is large enough to produce the high degree of obscuration inferred from multi-band diagnostics) is by means of high resolution extinction free observations.
The best wavelength domain is the far-IR, where water, OH and high-J CO lines (revealing massive outflows) can trace the gas motions and mesure the bulk of the molecular mass. Moreover, ionic fine structure lines produced by the AGN in the mid- to far-IR, can characterise the gas conditions, as well as the primary spectrum of the ionising source.

A spatial resolution of 0.1" will resolve sub-kpc structures and constrain the molecular torus in AGN at z<2.