

ALMA2019: Science Results and Cross-Facility Synergies



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The molecular torus of NGC1068

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Contributed talk

Abstract:

I will present results obtained with ALMA on the prototypical Seyfert 2 nucleus in NGC 1068. Previous CO (6-5) observation already showed evidence for a high-velocity outflow at a resolution of $\sim 0.04''$ resolution. We have now obtained data with a factor ~ 2 better resolution (~ 1 pc-scale) with the most extended ALMA configurations. We observed HCN J=3-2 to reveal a line profile against the radio nucleus which is consistent with the outflow observed in CO. The projected radial velocity of this molecular outflow is ~ 170 km/s with high velocity wings ranging up to 400 km/s. The nuclear spectrum also shows a narrow, redshifted absorption component at infall speed ~ 40 km/s. Analysis of the position-velocity diagram and the morphology of the integrated line flux map reveals two nested, rotating disk components. The inner disk, inside ~ 1.5 pc, has kinematics consistent with the edge-on, geometrically thin H₂O water megamaser disk. The outer disk, which extends to 7 pc, is also geometrically thin but inclined. The outer disk counter-rotates relative to the inner, water megamaser disk. I will conclude with a picture in which the torus consists of two geometrically thin, counter-rotating disks, and the nuclear obscuration occurs in outflowing molecular clouds whose origin is likely a hydromagnetic wind driven off of the inner disk.

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