Progress Report

REVEALING THE STRUCTURE OF AGN IN CIRCINUS

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Recent observations resolving for the first time a number of nearby AGN surprisingly revealed that a major fraction of their mid-infrared (MIR) emission comes from the polar regions, contrary to the expectation based on the unification scheme, which postulates an equatorial torus of dust. New highest quality MIR images of archetypal AGN in Circinus galaxy were obtained as part of the science verification program of the upgraded VISIR instrument mounted on the VLT. A striking feature of these images is a prominent bar extending 40 pc from both sides of the nucleus in the polar direction. Motivated by the observation across a wide wavelength range and on different spatial scales, we propose a dust emission model for AGN in Circinus consisting of a compact dusty disk and large-scale dusty cone shell, illuminated by a tilted accretion disk with anisotropic emission pattern. Undertaking detailed radiative transfer simulations, we demonstrate that such a model is able to explain the peculiar MIR morphology and account for the entire spectral energy distribution. Our results call for caution when attributing dust emission of unresolved sources entirely to the torus and warrant further investigation of MIR emission in the polar regions of AGN.