研究課題名 AGN 分子トーラスの構造とダイナミクスの輻射流体力学による解明

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We found a plausible mechanism to form so-called “obscuring tori” around the active galactic nuclei (AGNs), based on our three-dimensional hydrodynamic simulations with radiative feedback ray-tracing from the central source. The radiation pressure and X-ray heating, drive a ‘fountain’, namely vertical circulation of the gas in the central a few to tens parsecs region, and interaction between non-steady outflows and inflows cause turbulent motion. The ejected material and the geometrically thick “torus” supported by the internal turbulent motion obscure the AGN. The opening angle for the column density toward the BH $< 10^{23}$ cm^{-2} is about $\pm 30°$ and $\pm 50°$ for the AGN with 10% and 1% of Eddington luminosity, respectively. Mass inflow through the ‘torus’ coexists with the outflow and internal turbulent motion, and the average mass accretion rate to the central parsec is $2 \times 10^{-4} \sim 10^{-3} M_\odot$ pc^{-1}, which are ten times smaller to keep the AGN luminosity.

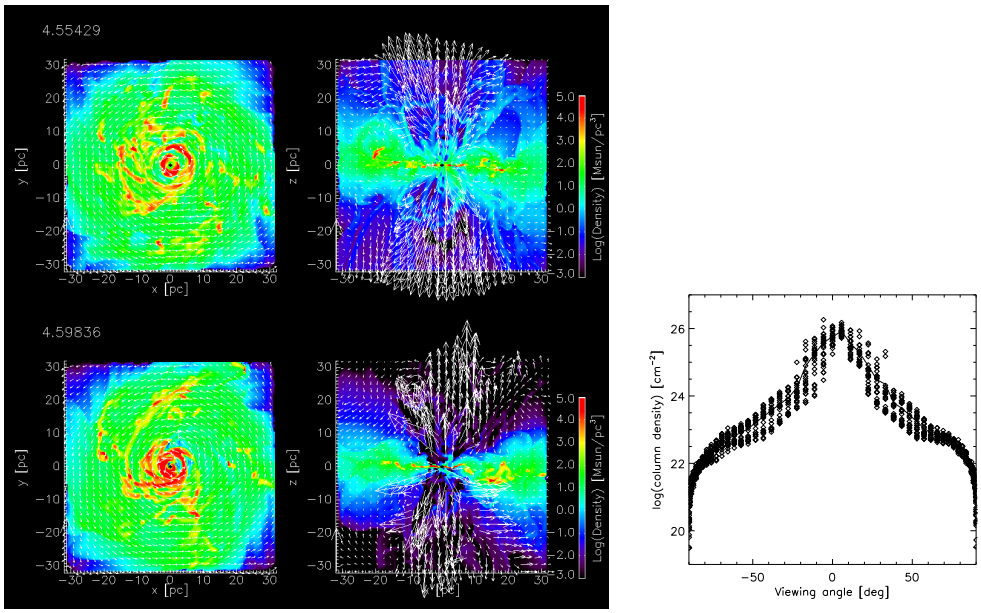

図 1: (left) Gas density in a quasi-steady state of model qi and qg. (right) Column density distribution as a funtion of the viewing angle. Eddington ratio = 0.1.