Prevalent non-negligible radiation pressure force exists on broad-line regions of active galactic nuclei
31 March 2022, by Li Yuan

These methods use the average virial factor derived from the other methods for reverberation mapped nearby AGNs, which will cause a larger systematic uncertainty of mass.

They found a positive correlation between the virial factor and dimensionless accretion rate of black hole, which is consistent with the prediction of considering radiation pressure force. There is a three-dimensional positive correlation of the virial factor with the dimensionless accretion rate and line ratio Fe II/H?, indicating that the virial factor is likely dominated by the dimensionless accretion rate and metallicity.

"We also find a negative correlation between the redward shift of H? and the scaled size of broad-line region radius in units of the gravitational radius of black hole," said Prof. Feng. This negative correlation will be expected naturally if the redward shift of H? is mainly from the gravity of black hole. Radiation pressure force from accretion disk radiation is a significant contributor to the virial factor.

These results show that the radiation pressure force on the gravitationally bound BLRs of AGNs is prevalent and non-negligible. These new findings help scientists to better understand the macroscopic effects of microphysical processes, as well as the physical structures and mechanisms in AGNs.
