J65a　Spectral energy distribution of super-Eddington flows

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Being considered as theoretical and exotic constructs in the past, black hole accretion disks are now known to appear on all scales and in a large variety of states, roughly classified by their total luminosity and their emitted spectrum. Depending primarily on the mass of the central black hole and on the accretion rate, the existence of states showing relatively low accretion rates and luminosities (compared to the Eddington limit) is now largely accepted. However, the question whether highly super-Eddington accretion and super- Eddington luminosities are feasible and also realized in these objects, is still subject of a controversial debate. The final answer to this question will have a huge impact on the theory of the growth of supermassive black holes in the early Universe and on the existence of intermediate mass black holes, for example in ultraluminous X-ray sources.

Therefore, we investigate the spectral energy distribution of super- Eddington accretion flows onto black holes for the stellar and the supermassive black hole cases. We study the continuum and iron K line emission, based on 2-dimensional radiation-hydrodynamic simulations. Previous investigations have shown that super-Eddington accretion produces powerful anisotropic outflows which leads to apparent super- Eddington luminosities due to beaming effects. However, Comptonization needs to be included in the simulations to account for present observations, in particular for the observed high effective temperatures. We therefore present new results on the continuum and line emission spectra, including Compton-cooling of the gas. By comparing our results with current and future observations, we expect to provide valuable constrains on the existence of super-Eddington states in black hole accretion disks.