

A century of the study of Accretion processes around stars and compact objects

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Abstract

Since the time Eddington came up with the concept of a critical rate of accretion on the stars solely based on the mass of the star and some fundamental constants the subject has come a long way. After the 1924 definition of the Eddington rate, we have seen works of Bondi, Hoyle and Littleton in 1930s to 1950s, both in the context of pressureless and normal fluid. After a decade long debate on the efficiency and efficacy of the fast moving spherically symmetric Bondi flow, especially after the discovery of the quasars, Shakura and Sunyaev came up with a disk-like accretion flow rotating with a Keplerian in 1973. Though its efficiency is high and reproduced the lower energy bump of the spectra from both the compact binaries and Active galaxies, fitting of an observed power-law component required a new physics, namely, the science of Compton Scattering to be included into computing the spectrum. At the same time, the hydrodynamics had to be perfected along the line of Bondi's treatment including viscosity, radiative transfer, rotation and most importantly, proper boundary condition prevalent in flows on a star surface or compact object boundary. The rotational force introduces new structure in the flow. Our conclusion is that the overall understanding is reaching a saturation so that the subject of accretion has earned the status of a Science subject outside the realms of drawing cartoons.

Key words: Accretion, Accretion Disk, Black-Hole.