Title: PROBING THE ACCRETION DISK WITH THE GRAVITATIONAL WAVE.

MONDAL SOUMEN , JADAVPUR UNIVERSITY, KOLKATA, INDIA.

ABSTRACT : Gravitational wave signal characteristics from a binary black hole system in which the companion moves through the accretion disc of the primary are studied. We chose the primary to be a super-massive Kerr black hole and the companion to be a massive black hole (with Extreme Mass ratio EMR between 100-1000) to clearly demonstrate the effects. We show that the drag exerted on the companion by the disc is sufficient to reduce the coalescence time of the binary. The drag is primarily due to the fact that the accretion disc on a black hole deviates from a Keplerian disc and becomes sub-Keplerian due to inner boundary condition on the black hole horizon. We consider two types of accretion rates on to the companion. The companion is deeply immersed inside the disc and it can accrete at the Bondi rate which depends on the instantaneous density of the disc. However, an accretion disc can also form around the smaller black hole and it can accrete at its Eddington rate. Thus, this case is also studied and the results are compared. We find that the effect of the disc will be significant in reducing the coalescence time and one needs to incorporate this while interpreting gravitational wave signals emitted from such a binary system.