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UNIVERSITÉ DE GENÈVE
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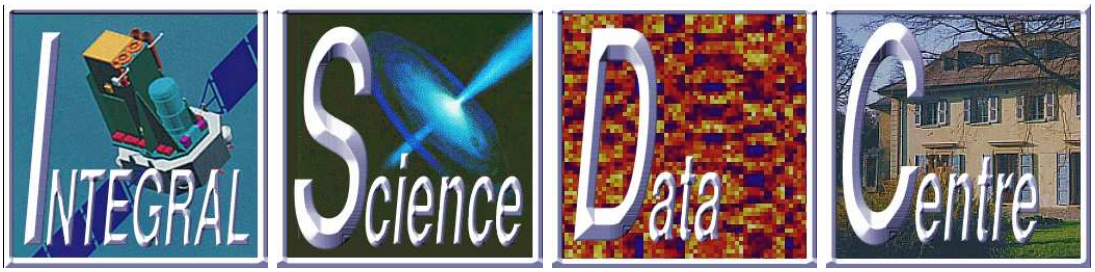
ASTROPHYSICS SEMINAR



Tuesday, 6 March 2007 at 11:00

General Relativistic Flux Modulations from Disk Instabilities in Sagittarius A*

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Abstract. The compact radio source Sgr A* at the center of our Galaxy provides the most compelling evidence for the existence of supermassive black holes. Both near-IR and X-ray flares have been detected from this object, sometimes modulated with a (quasi)-period of 17-20 minutes, suggesting an emission region at $\sim$3 R_S, where R_S is the Schwarzschild radius for an inferred mass of $\sim$3.7 10^6 $M_\odot$. The latest X-ray flare, detected with XMM-Newton, is notable for its detailed lightcurve, which not only yields the highest quality period thus far, but also reveals important structure reflecting the geometry of the emitting region. Recent simulations of Sgr A*'s disk have revealed the growth of a Rossby wave instability (particularly in its MHD form), that enhances the accretion rate for several hours, possibly accounting for the observed flares. In this seminar, I will present how I carry out state-of-the-art ray tracing calculations in a Schwarzschild metric to determine as accurately as possible the lightcurve produced by general relativistic light-bending, lensing effect, doppler effect and travel time delay during such a disruption. The Rossby-wave induced spiral pattern in the disk is an excellent fit to the data, implying a disk inclination angle of $\sim$77°. Note, however, that if this association is correct, the observed period is not due to the underlying Keplerian motion but, rather, to the pattern speed. The favorable comparison between the observed and simulated lightcurves provides important additional evidence that the flares in Sgr A* are produced merely a handful of Schwarzschild radii above the event horizon.

Additional Information

The seminars are given in the ISDC "Pavillon" building
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