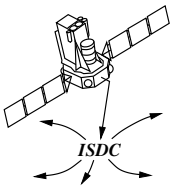

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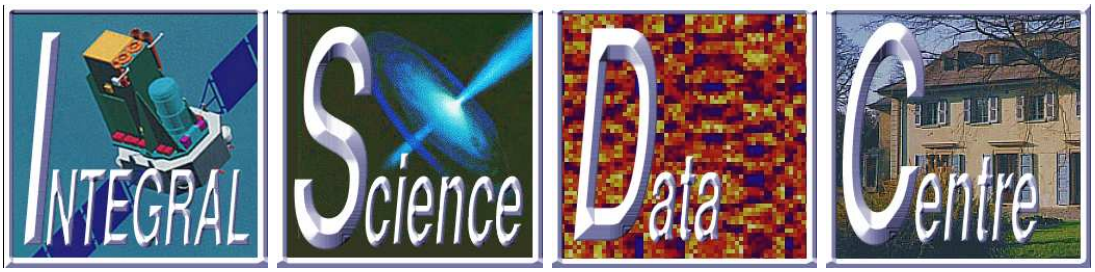

Thursday, 4 November 2004 at 11:00

The tidal disruption of stars by a supermassive binary black hole

Pavel Ivanov
Queen Mary College (London) & Astro Space Centre of Lebedev Physics Institute (Moscow)

Abstract. In this talk I would like to consider the problem of tidal disruption of stars in the centre of a galaxy containing a supermassive binary black hole with non-equal masses. I show that the bulk of the stars with a small value of the angular momentum projection on the axis perpendicular to the binary orbital plane can obtain a small absolute value of the angular momentum during the secular evolution in the gravitational field of the binary, and hence these stars can be tidally disrupted by the larger black hole residing in the centre of the stellar distribution. This effect is analogous to the so-called Kozai effect well known in celestial mechanics. I also discuss an analytical theory of the secular evolution of the stellar orbits in the gravitational field of the binary and of the stellar cluster, estimate the rate of tidal disruption and confront it with a simple numerical model.

It is shown that when the larger black hole has a mass $> 10^7 M_\odot$, the mass ratio of the two black holes is $> 10^{-2}$, and the size of the inner part of the stellar cluster where the gravitational field of the central black hole is dominant is of the order of ~ 1 pc, the tidal disruption rate can be as large as $\sim 1 M_\odot$/yr. This is at least 10^4 times larger than it was estimated for the tidal disruption rate in the centre of a galaxy containing a single supermassive black hole.

Additional Information

The seminars are given in the ISDC "Pavillon" building
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