



I N T E G R A L
SCIENCE DATA CENTRE

Centre attaché à l'Observatoire de Genève



UNIVERSITÉ DE GENÈVE

ASTROPHYSICS SEMINAR



Wednesday, July 9, 2003 at 16:00

On the Nature of the X-ray Emission from Accreting Millisecond Pulsars

Juri Poutanen

(University of Oulu, Finland)

Abstract. We study the pulse profiles of the accreting X-ray millisecond pulsar SAX J1808.4-3658 at different energies. The observed variability can be explained if the emission is produced by Comptonization in a hot slab (radiative shock) of Thomson optical depth 0.3–1 at the neutron star surface. The emission patterns of the black body and the Comptonized radiation are different: a “pencil”- and a “fan”-like, respectively. We construct a detailed model of the X-ray production accounting for the Doppler boosting, relativistic aberration and gravitational light bending in the Schwarzschild space-time. Our model reproduces well the pulse profiles at different energies simultaneously, corresponding phase lags, as well as the time-averaged spectrum. We constrain the compact star mass to be bounded between 1.2 and 1.6 solar masses. The radius is determined to be 8.5 ± 0.5 km or 10.8 ± 0.7 km for a 1.4 or 1.6 solar mass neutron star, respectively. This puts strong constraints on the neutron star equation of state.

Additional Information

The seminars are given in the ISDC “Pavillon” building

Address: INTEGRAL Science Data Centre, ch. d'Écogia 16, CH-1290 Versoix

WWW: ISDC Seminars: <http://isdc.unige.ch/index.cgi?Science+seminars>