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INTEGRAL observations of SS433: Results of a coordinated campaign

Cherepashchuk A., Sunyaev R., Fabrika S., Postnov K., Molkov S., Barsukova E., Antokhina E., Irsmambetova T., Panchenko I., Seifina E., Shakura N., Timokhin A., Bikmaev I., Sakhibullin N., Aslan Z., Khamitov I., Pramsky A., Sholukhova O., Gnedin Y., Arkharov A., Larionov V.

Kazan Federal University, 420008, Kremlevskaya 18, Kazan, Russia

Abstract

Results of simultaneous INTEGRAL and optical observations of the galactic microquasar SS433 in May 2003 and INTEGRAL/RXTE observations in March 2004 are presented. Persistent precessional variability with a maximum to minimum uneclipsed hard X-ray flux ratio of ~4 is discovered. The 18-60 keV X-ray eclipse is found to be in phase with optical and near infrared eclipses. The orbital eclipse observed by INTEGRAL in May 2003 is at least two times deeper and apparently wider than in the soft X-ray band. The broadband 2-100 keV X-ray spectrum simultaneously detected by RXTE/INTEGRAL in March 2004 can be explained by bremsstrahlung emission from optically thin thermal plasma with kT ~ 30 keV. Optical spectroscopy with the 6-m SAO BTA telescope confirmed the optical companion to be an A5-A7 supergiant. For the first time, spectorscopic indications of a strong heating effect in the optical star atmosphere are found. The measurements of absorption lines which are presumably formed on the non-illuminated side of the supergiant yield its radial velocity semi-amplitude Kv = 132 ±9 km s-1. The analysis of the observed hard X-ray light curve and the eclipse duration, combined with the spectroscopically determined optical star radial velocity corrected for the strong heating effect, allows us to model SS433 as a massive X-ray binary. Assuming that the hard X-ray source in SS433 is eclipsed by the donor star that exactly fills its Roche lobe, the masses of the optical and compact components in SS433 are suggested to be Mv ≈ 30 M⊙ and Mx ≈ 9 M⊙, respectively. This provides further evidence that SS433 is a massive binary system with supercritical accretion onto a black hole. © ESO 2005.

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Keywords

Stars: binaries: close, Stars: individual: SS433, X-rays: binaries