

The 2002 outburst of the accretion-powered millisecond X-ray pulsar SAX J1808.4-3658

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We present the results of the analysis of 2002 outburst of the millisecond X-ray pulsar SAX J1808.4-3658. The object is a neutron star that experiences accretion on its magnetic poles leading to the presence of the "hot spots". Rotation of the star let the observer see the flux pulsations at a frequency of 401 Hz, in case of the SAX J1808.4-3658. The source experiences outbursts every two years on average which last for about a month. The RXTE satellite observed the source during the 2002 outburst and the resulting dataset contains about 700 ksec of data. Analyzing these data, we demonstrate the evolution of the pulse profile, spectral shape and timing characteristics during the outburst. We notice four different stages of the outburst, where the source behavior changes significantly. Besides the phenomenological analysis, we analyze the source spectrum using physical models and separate possible spectral components - emission from the accretion disk, "hot spot" on a neutron star surface and Comptonized emission from an accretion shock. Also, we perform the phase-resolved spectroscopy and compare the pulse shape on different stages of the outburst to the theoretical model of Poutanen and Gierlinski (2003, MNRAS, 343, 1301)