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PLASMAS E ALTAS ENERGIAS

SIMULTANEOUS RADIO/X-RAY OBSERVATIONS OF SCO X-1

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We present simultaneous radio/X-ray observations of Sco X-1, the brightest persistent LMXB in the soft X-ray band and also the brightest radio source among neutron stars LMXBs. From recent VLBI observations of Sco X-1 a variable core and two (also variable) radio lobes (jets) were discovered, with lobes moving with an average speed of 0.45 c. Hard X-ray studies of Sco X-1 were presented before based on HEXTE/RXTE data, showing a variable hard X-ray tail without any correlation with mass accretion rates states. Our results are derived from observations carried out in 1999 by RXTE (soft to hard X-rays), VLA, APT and EVN (radio) and represent a unique chance for any correlation studies between the radio/X-ray emission in LMXB harbored by neutron stars. We found that the source was not observed often in the flaring branch (FB) part of the X-ray color diagram (CD), as expected from models predicting that during radio loud states the accretion rate should be not so large. We observed a hard X-ray tail (HXT) only once (UT date 12.00 to 12.11) after a peak in the radio emission of the core (UT date 11.70). This was the only HXT observed after a peak in the radio emission, suggesting that there's no correlation between the production of hard X-rays and jet emission in Sco X-1, as opposed to X-ray binaries containing black holes. This HXT detection follows the idea proposed by D'Amico et al. (ApJ 547, L147, 2001; Adv. Spa. Res. 28, 389, 2001) that the hard X-ray spectrum is as flat as the mass accretion rate increases. It also fits the idea, by the same authors, that the production of HXT in Z sources is a process triggered when the thermal brightness of the source is above a certain threshold value. Since the HXT production is not correlated with accretion rate these observations may be indicating that the production of hard X-ray tails in Sco can occur very near or at the neutron star surface. In conclusion, we can see from our results that the models used to explain the hard X-ray production from the radio jet emission in X-ray binaries containing black holes can not be used in the case of Sco X-1.