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SGRA* EMISSION AT 7 MM

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SgrA* is a compact radio source coincident with the position of the supermassive black hole at the center of our Galaxy. It is surrounded by a complex of HII regions, known as SgrA. SgrA* presents variable emission, from radio to X-rays, with timescales that range from hours to months. Interferometric observations at frequencies up to 22 GHz have detected a 106 days quasi-periodicity in the light curves of SgrA* (Zhao et al. 2001). In our work, we present the result of 43 GHz (7 mm) single dish observations obtained with the Itapetinga radiotelescope, located in Atibaia, Brazil, during several long lasting campaigns starting in 2006, which aimed to detect variability and verify the existence of periodicity.

The observations were made between 2006, June 21 and 2010, July 23. The antenna beam resolution of the Itapetinga Radiotelescope is 2.2 arc min and the method of observation was scans in right ascention, with 30′ amplitude and 20 s duration. Using the scanning technique we were able to separate the contribution of SgrA* from that of SgrA that was used as an instantaneous calibrator. Sgr B2 Main was observed alternately with SgrA* every 30 scans and it was used as quasi-simultaneous calibrator. The difference between the two calibrated values gives a measure of the error in the flux density. Daily variability was detected, compatible with what was reported at 7 mm using VLBI techniques (Lu et al. 2008).

Our results are show in the Figure 1. The maximum amplitude variability was approximately 1 Jy (maximum 2.66 ± 0.33 Jy and minimum 1.52 ± 0.03 Jy) and the mean flux density was 2 Jy. We have 4 days of coincident observations with the ATCA (Australia Telescope Compact Array) monitoring campaign at 3 mm (Li et al. 2009) which show the same density flux and variability behaviour. The 43 GHz light curve show an increase of the amplitude of variability with frequency, as first reported by Zhao et al. (1992) from observations between 1.5 and 22.5 GHz. The expected 106 day periodicity was only obtained after the superposition of 13 cycles, similar to what was found in the 22 GHz VLA (Very Large Array) observations. In Figure 2 we compare our light curve, modulated with a 106 day period, with the cycle found at 1.3 cm using the VLA. This is the first time that the 106 day cycle was detect at 7 mm.

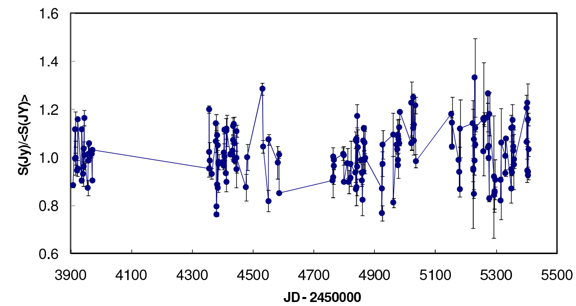

Fig. 1. 7 mm light curve of SgrA*. The flux density is normalized relative to its average value.

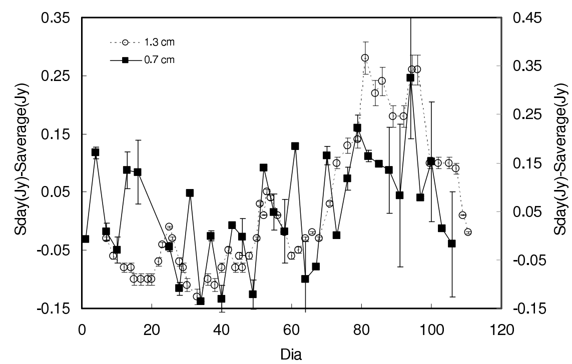

Fig. 2. VLA 1.3 cm light curve (circles, left axis; Zhao et al. 2001) and Itapetinga 7 mm average light curve (squares, right axis).

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