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A large spin-up glitch detected in the 70.5 ms pulsar AX J1838.0-0655 associated with HESS J1837-069

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Subjects: X-ray, Gamma Ray, >GeV, Neutron Star, Pulsar

Monitoring observations of AX J1838.0-0655 with the PCA instrument (2-60 keV) aboard the Rossi X-ray timing Explorer performed since its discovery (see ATEL #1392) as fast rotation-powered pulsar on 2008, February 17 up to and including 2010, January 26, have been used to study its rotation characteristics (see e.g. ATEL #1405). The timing analysis revealed the presence of a large spin-up glitch, occurring somewhere between MJD 55002 and MJD 55018 (2009, June 20 - July 6), with a fractional frequency jump size of $1.55(7) \times 10^{-6}$. The size of this value is near the upper end of the histogram showing the distribution of the fractional frequency glitch sizes of both rotation-powered pulsars and anomalous X-ray pulsars (see e.g. Fig. 15a of Dib et al. 2008, ApJ 673, 1044).

The pre-glitch ephemeris, covering the range MJD 54513-55002, is specified by a frequency of 14.184758189(1) Hz, a first order time derivative of $-9.9295(1) \times 10^{-12}$ Hz/s and a second order time derivative of $1.95(6) \times 10^{-22}$ Hz/s$^2$, all evaluated at epoch 54513.0 MJD (TDB; DE200). The post-glitch ephemeris, covering the range MJD 55018-55222, is given by a frequency of 14.184758189(1) Hz, a first order time derivative of $-9.9910(1) \times 10^{-12}$ Hz/s and a second order time derivative of $1.0(4) \times 10^{-21}$ Hz/s$^2$, all evaluated at epoch 55136.0 MJD (TDB; DE200). The latter ephemeris can be improved in future once more monitoring observations come available.