

## Timing Noise in PSR 1821–24 : a Micro-Glitch Observed in a Recycled Millisecond Pulsar

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**Abstract.** We report the observation of a very small glitch observed for the first time in a millisecond pulsar, PSR B1821–24, located in the globular cluster M28. Timing observations were mainly conducted with the Nançay radiotelescope and confirmation comes from the 140-ft Green Bank telescope data. This event is characterized by a rotation frequency step of 3 nHz or  $10^{-11}$  in fractional frequency change. Timing residuals of 1821–24 at Nançay and Green Bank (crux) obtained with a set of pulsar parameters adjusted up to Feb 2001 are shown in the left figure below. After March 2001, both TOAs from original set of parameters and TOAs obtained with a  $\Delta P/P$  change of  $10^{-11}$  are also shown. The evolution of the PSR B1821–24 rotational frequency is shown on the right. This glitch follows the main characteristics of those in the slow period pulsars, but is two orders of magnitude smaller than the smallest ever recorded. Such an event must be very rare in millisecond pulsars since no other glitches have been detected when the cumulated number of years of millisecond pulsar timing observations up to 2001 is around 500 for all these objects. We should, however, keep in mind that PSR B1821–24 is one of the youngest among the old recycled pulsars. While this event happens on a much smaller scale, the required adjustment of the star to a new equilibrium figure as it spins down is a likely common cause for all glitches.

