PSR J1023+0038: $P_{\text{spin}} = 1.69 \text{ ms}$, $P_{\text{orb}} = 0.198 \text{ d}$

“Hidden” Millisecond Pulsars
Tavani (1991)
“The First Radio-Selected Cataclysmic Variable”

Spectrum of FIRST J1023+0038

“Is FIRST J1023+0038 Really a Cataclysmic Variable?”
Thorstensen & Armstrong (2005)

Answer: No, it’s “A Radio Pulsar/X-ray Binary Link”
Archibald et al. (2009)
The Radio-Pulsar Years: 2002 – 2013
PSR J1023+0038 in LINEAR and Catalina Sky Surveys
Accretion Resumes: 2013-2015 at MDM Observatory
Three X-ray levels: “low”, ‘high”, and ‘flare”.

$L_x \approx 3 \times 10^{33}\text{ erg s}^{-1} (< 10^{-4}L_{\text{edd}})$.

1.69 ms X-ray pulsations detected in “high” level only.
Models: Pulsar Wind Shock or Propeller Accretion?

1) Pulsar Wind Shock: Takata et al. (2014)

Light cylinder radius $R_{lc} = 8 \times 10^6$ cm.
Corotation radius $r_{cr} \approx 2.5 \times 10^6$ cm.
In both models $\dot{M} \sim 10^{16}$ g s$^{-1}$.

2) Propeller Accretion: Lovelace et al. (1999)
Latest *Fermi* Accreting MSP Discovery

3FGL J1544.6−1125: Bogdanov & Halpern (2015)

PSR J1544−1128: $P_{\text{spin}}$ and $P_{\text{orb}}$ not yet known . . .