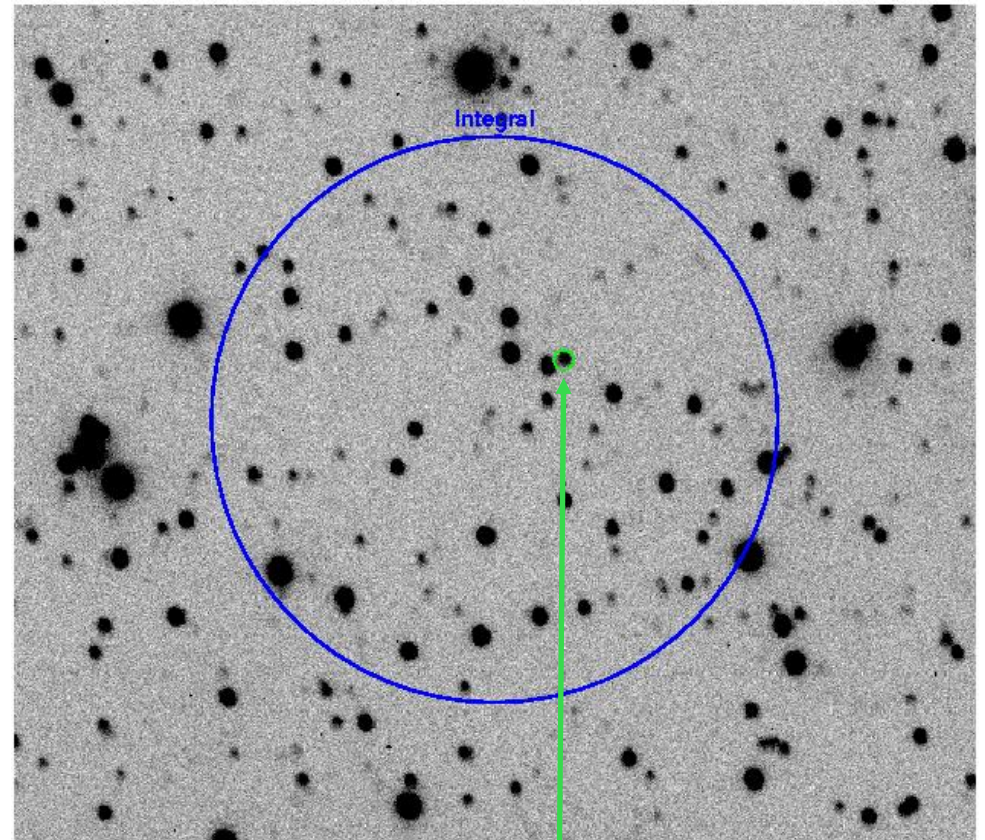


The 599 Hz X-ray pulsar IGR J00291+5934

D. K. Galloway¹, C. B. Markwardt², E. H. Morgan¹, D. Chakrabarty¹, T. E. Strohmayer² and R. Remillard¹

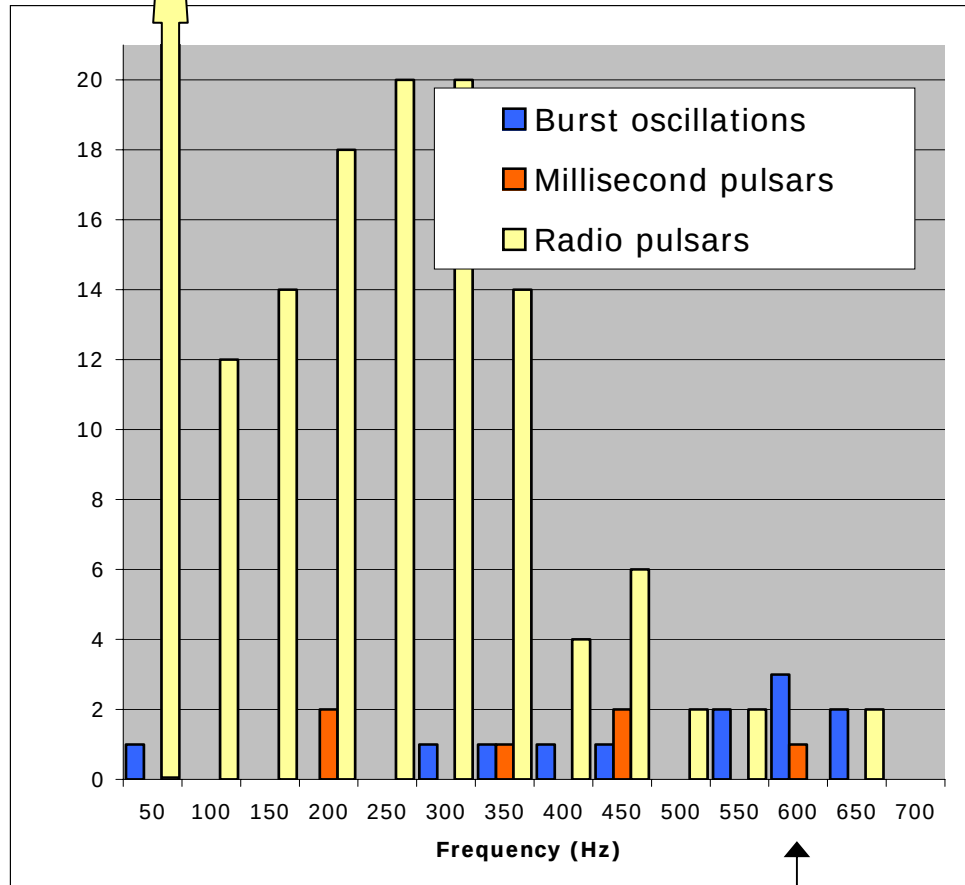
1. *Center for Space Research, MIT*; 2. *LHEA, NASA Goddard Space Flight Center*

- Discovered Dec. 2 by *INTEGRAL* (Eckert et al., ATel 352)
- *RXTE* observations revealed 599 Hz pulsations with $\sim 9\%$ amplitude (Markwardt et al. ATel 353)
- Mission-long ASM lightcurve revealed two previous outbursts, 3 and 6 years previously (Remillard et al., ATel 357)
- Variable radio counterpart (ATels 355, 361, 364)



R ~ 17.4 optical counterpart (Fox & Kulkarni, ATel 354; see also ATels 356, 363, 366)

The fastest millisecond X-ray pulsar... so far



- Compare with two fastest radio pulsars at 622, 642 Hz, and fastest burst oscillation source at 620 Hz
- Assuming mass transfer is driven by gravitational radiation in the 2.46 hr binary orbit, distance is 3.3-12 kpc
- Mass function = $2.8 \cdot 10^{-5} M_{\odot}$; minimum companion mass is $0.038 M_{\odot}$, likely a heated brown dwarf donor (e.g. Bildsten & Chakrabarty 2001, ApJ 557, 292)
- INTEGRAL* offers a new avenue for detecting these rare sources

IGR J00291+5934:

$$f_0 = 598.892130657(2) \text{ Hz}$$

$$a_X \sin i = 64.9912 \text{ lt-ms}$$

$$P_{\text{orb}} = 8844.0903(6) \text{ s}$$

$$T_{90} = 53345.18751580(5) \text{ MJD}$$