

## Searching for FAST Pulsars

M. McLaughlin, J. M. Cordes, and Z. Arzoumanian

*Cornell University Department of Astronomy*

**Abstract.** We outline the pulsar search capabilities of the AOFTM, describe results from recent searches, and discuss future plans.

### 1. The AOFTM (Arecibo Observatory Fourier Transform Machine)

- Time resolution:  $\Delta t = m2^{-n}102.4\mu s, 1 \leq m \leq 2^n \times 16$
- Frequency channels:  $N_\nu = 2^{-n}1024, n = 0, 1, 2, 3, 4$
- 10 MHz total bandwidth
- More information online at <http://www.naic.edu/~aoftm>

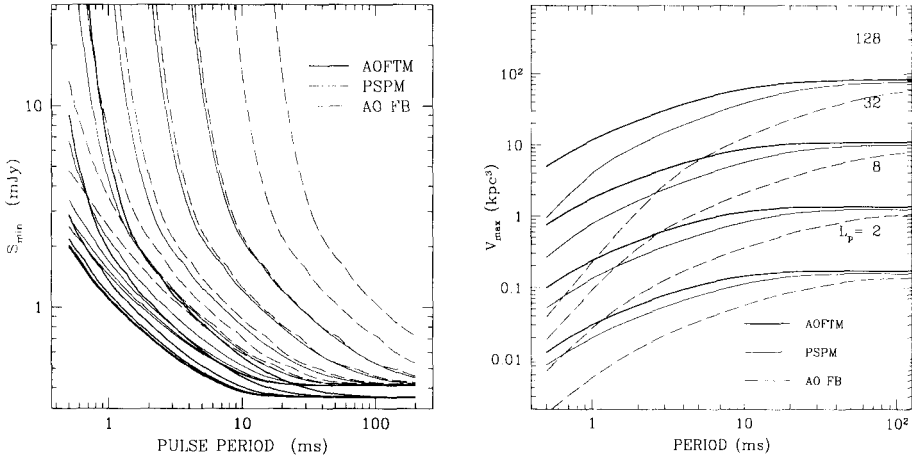


Figure 1. Left: Minimum detectable flux density ( $8.5 \sigma$ ) for 40 s of integration at 430 MHz for the AOFTM ( $2 \times 1024 \times 10$  kHz), PSPM ( $2 \times 128 \times 60$  kHz), and old AO filterbank ( $2 \times 32 \times 250$  kHz). The 8 lines per machine denote DMs of 0, 10, 20, 40, 80, 160, 320, & 640 pc/cm<sup>3</sup>. Right: Volume sampled in low latitude survey of 680 square degrees for the AOFTM, PSPM, and AO filterbank. Curves account for dispersion and scattering smearing and are a function of pseudoluminosity  $L_p$  (mJy kpc<sup>2</sup>).

## 2. Recent Results

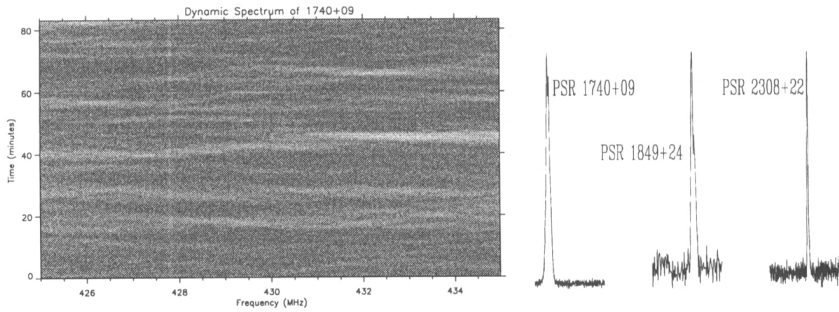


Figure 2. Left: Interstellar scintillation of pulsar 1740+09. Right: Folded pulse profiles for 3 recently discovered pulsars: 1740+09 ( $P=154$  ms,  $DM=16$  pc cm $^{-3}$ ), 1849 + 24 ( $P=275$  ms,  $DM=62$  pc cm $^{-3}$ ), and 2308 + 22 ( $P=535$  ms,  $DM=10$  pc cm $^{-3}$ ).

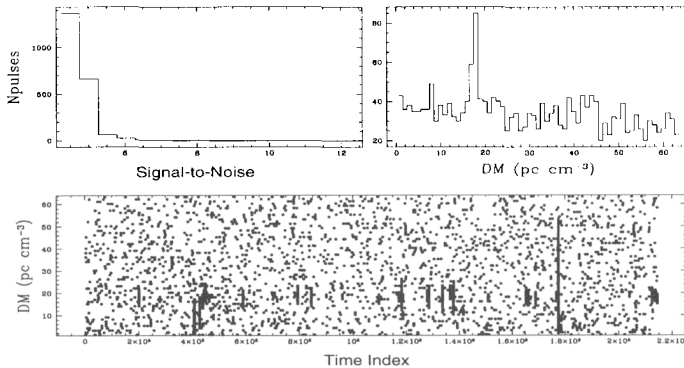


Figure 3. Histograms show number of isolated, dispersed pulses above threshold ( $4\sigma$ ) vs. signal-to-noise and DM for 1740+09. Lower plot shows pulses above threshold vs. DM and time.

## 3. Future Plans

We are currently using the AOFM to search for 1) high-velocity pulsars at high latitudes, 2) millisecond pulsars at latitudes  $|b| \sim 20^\circ$ , where the detection volume maximizes (Cordes & Chernoff 1997), 3) isolated, dispersed ‘giant’ pulses from Crab-like pulsars in M33, 4) pulsars in fast binaries, and 5) pulsars with short spin periods.

## References

Cordes, J. M., & Chernoff, D. F. 1997, *ApJ*, 482, 971