

LSC Periodic GW Detection & Flux Constraint Group (PULG)

Summary Report

Mike Zucker, Stuart Anderson

LIGO Science Collaboration Meeting

LIGO Livingston Observatory

20-23 March, 2002



Search Techniques & LSC Presenters

- Known pulsars

 - heterodyned time domain (Dupuis)

 - demodulated FFT frequency domain (Mendell)

- Low-resolution, arbitrary position/spindown (Riles)

- Hough hierarchical area search (Berukoff, Creighton)

Pulsars

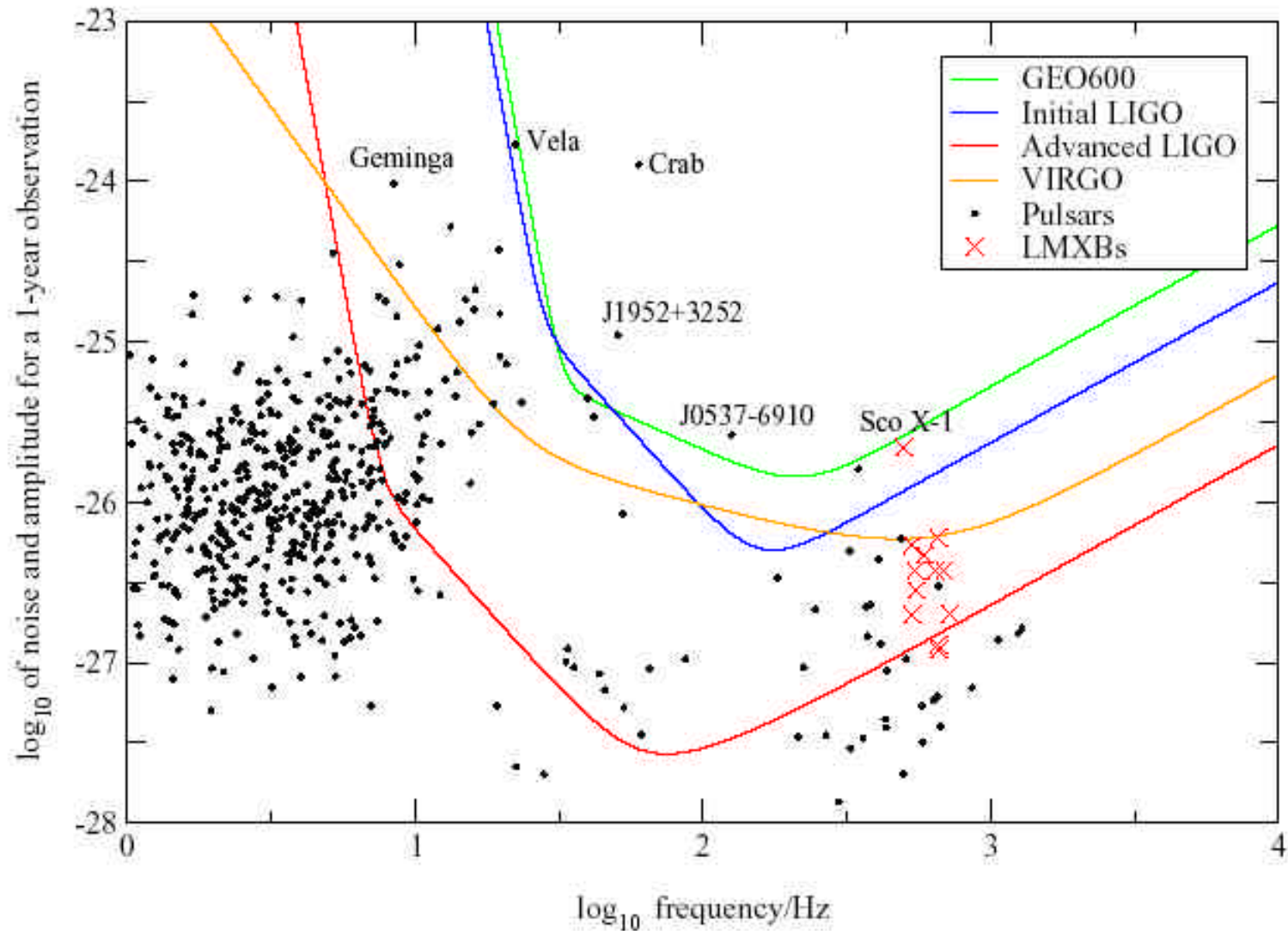


Figure 1: from Jones (gr-qc/0111007).

Our Pulsar Searches

- Frequency domain *knownpulsardemod* (Mendell, LHO)

LDAS DSO for generating ShortFT's complete, MDC tested, running on E7 data

Can feed SFT into LALdemod for given sky position, frequency, spindown

Need to test pipeline in new MDC

Working out statistics, search criteria, etc.; no sensitivity estimate yet.

- Time domain *knownpulsartd* (Dupuis, Glasgow)

Complete pipeline now in place & tested

Have run through 15 days of GEO strain signal from E7

Preliminary sensitivity estimate, e.g., PSR J1939+2134 (1284 Hz) $h < 10^{-20}$

Working on Monte Carlo tests, other pulsars, & application to LIGO E7 data

“Blind” searches

- **Low-resolution incoherent averaging (Riles, Chin, UM)**
 - Just getting started: large commitment to E7, investment in LDAS infrastructure
 - Use SFT's as feed stock, piggyback on other LDAS code to speed development
 - Sensitivity expected to be limited by nonstationarity and instrumental lines
- **Hough hierarchical area search (Papa, AEI)**
 - Main part of pipeline is operational and undergoing tests; working on timing
 - Behind schedule on generating SFT feed stock (use Mendell's?)
 - Working on output of candidate events, statistics, etc.
 - Currently anticipating first report on E7 data for May
- **Economical joint sky position/spindown search mesh (Creighton)**
 - Takes advantage of degeneracy between Doppler and spindown signatures
 - Proposed perturbative approach to defining efficient search mesh