

Pulsar Scintillometry

Ue-Li Pen, M. van Kerkwijk, K. Vanderlinde and many more

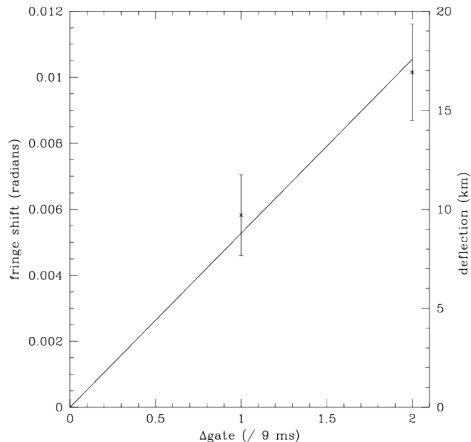
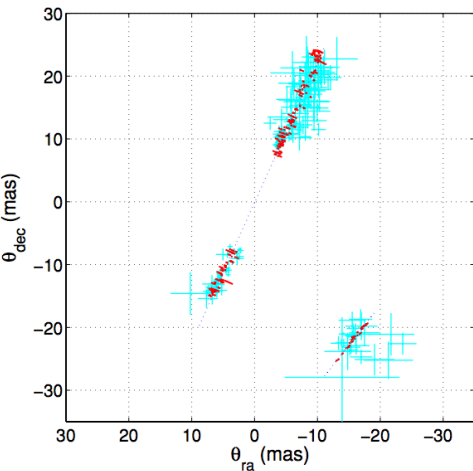
Sept 22, 2014

History

- ▶ April 17, 1967. First VLBI ARO-DRAO, Galt, Yen et al.
- ▶ IEEE Milestone: *VLBI combines the signals of widely separated telescopes in order to form a single observation range. In the experiment that was recognized as an IEEE Milestone, the range achieved between a first telescope at the DRAO facility in Penticton, British Columbia and a second one in Algonquin Park, Ontario was 3,074 kilometers*
- ▶ the next IEEE milestones: invention of LCD's, CERN, internet.
- ▶ Achieved with CBC video tape recorders, 5 MHz bandwidth
- ▶ Modern processing: 400 MHz bandwidth, digital signal processing
- ▶ Galt and Lyne 1972: DRAO-JB pulsar observations

Scintellometry

- Brisken et al 2010, ULP+2014 (** xv files **)



Current Status

- ▶ Successful VLBI run in 2014.
- ▶ Simultaneous ARO-DRAO observations, like 1967, two orders of magnitude more bandwidth (400-800 MHz), widest low frequency VLBI.
- ▶ goal to redevelop Canadian VLBI network, pending CFI proposal.
- ▶ 200+TB of data converging on Toronto BGQ.

Looking forward

- ▶ regular DRAO-ARO broadband pulsar VLBI + other networks
- ▶ emission structure of pulsars
- ▶ binary orbit parameters: potentially most massive neutron star 1957+20
- ▶ ISM lensing: precise distances?
- ▶ ISM structure: superconducting cosmic strings? strange quark nuggets? Evaporating dark matter? Reconnection sheets?

Speculation

- ▶ grazing incidence reconnection sheets
- ▶ ULP + Levin 2014
- ▶ ULP + King 2012
- ▶ 1-D structure
- ▶ localized scattering

