

Emission Geometry and Periodic Q-mode Modulation of PSR J1825-0935

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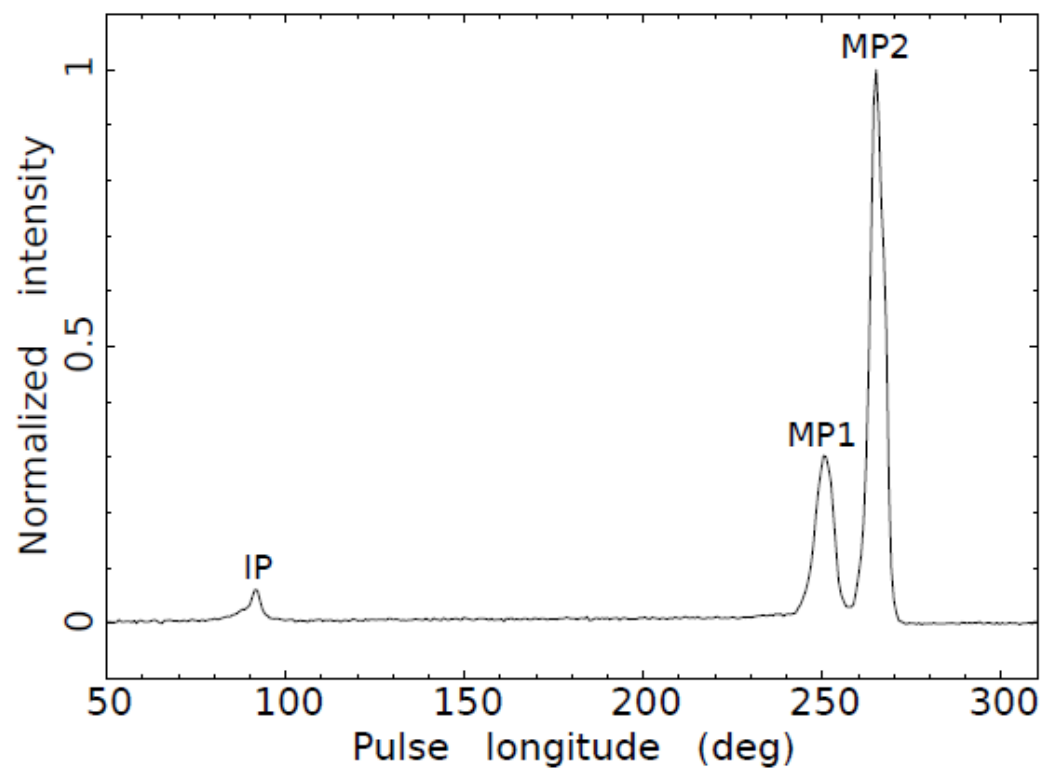
Xinjiang Astronomical Observatory, CAS

2018.07.03

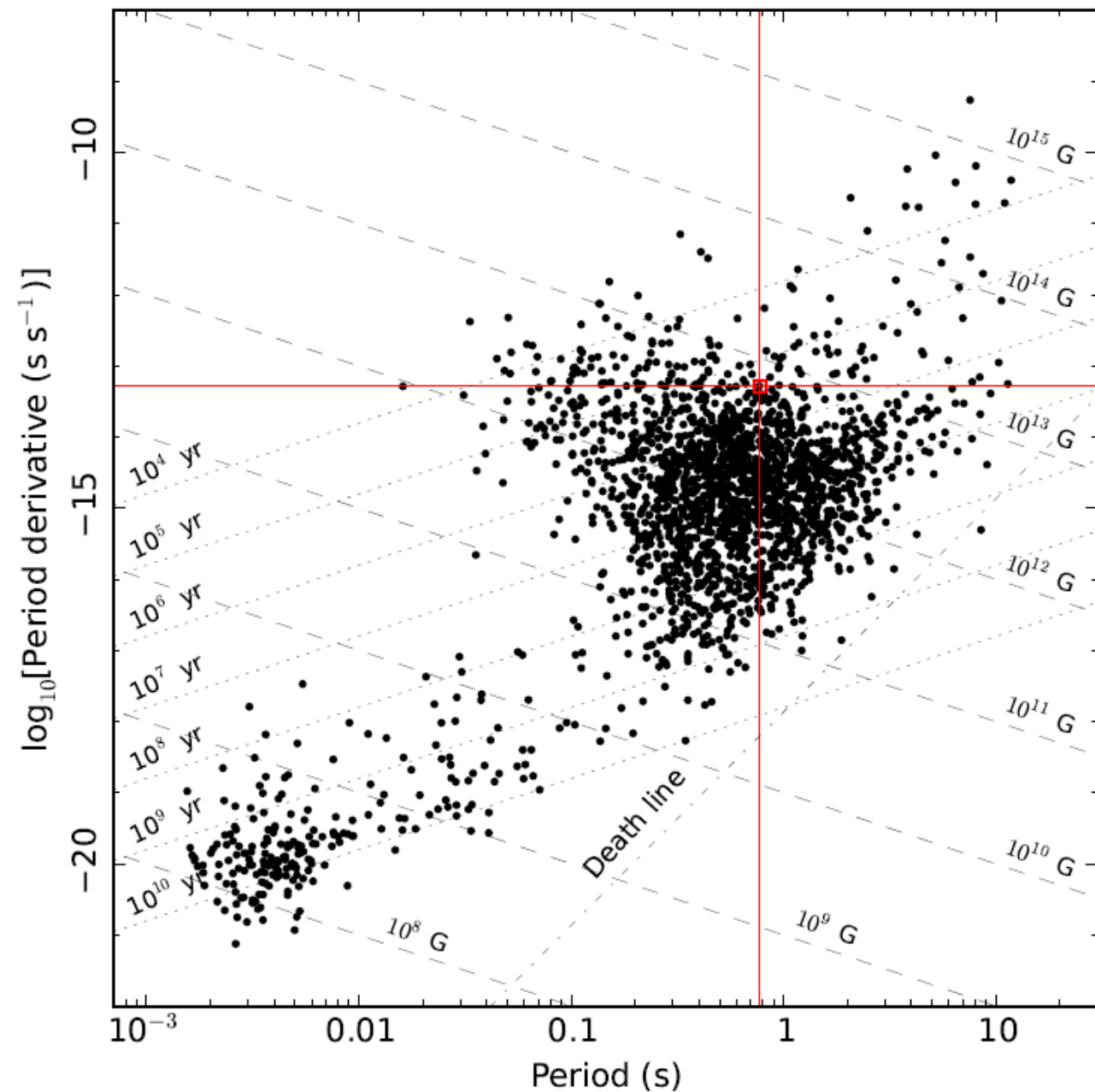
Outline

- Background
- Observations
- Results
- Summary

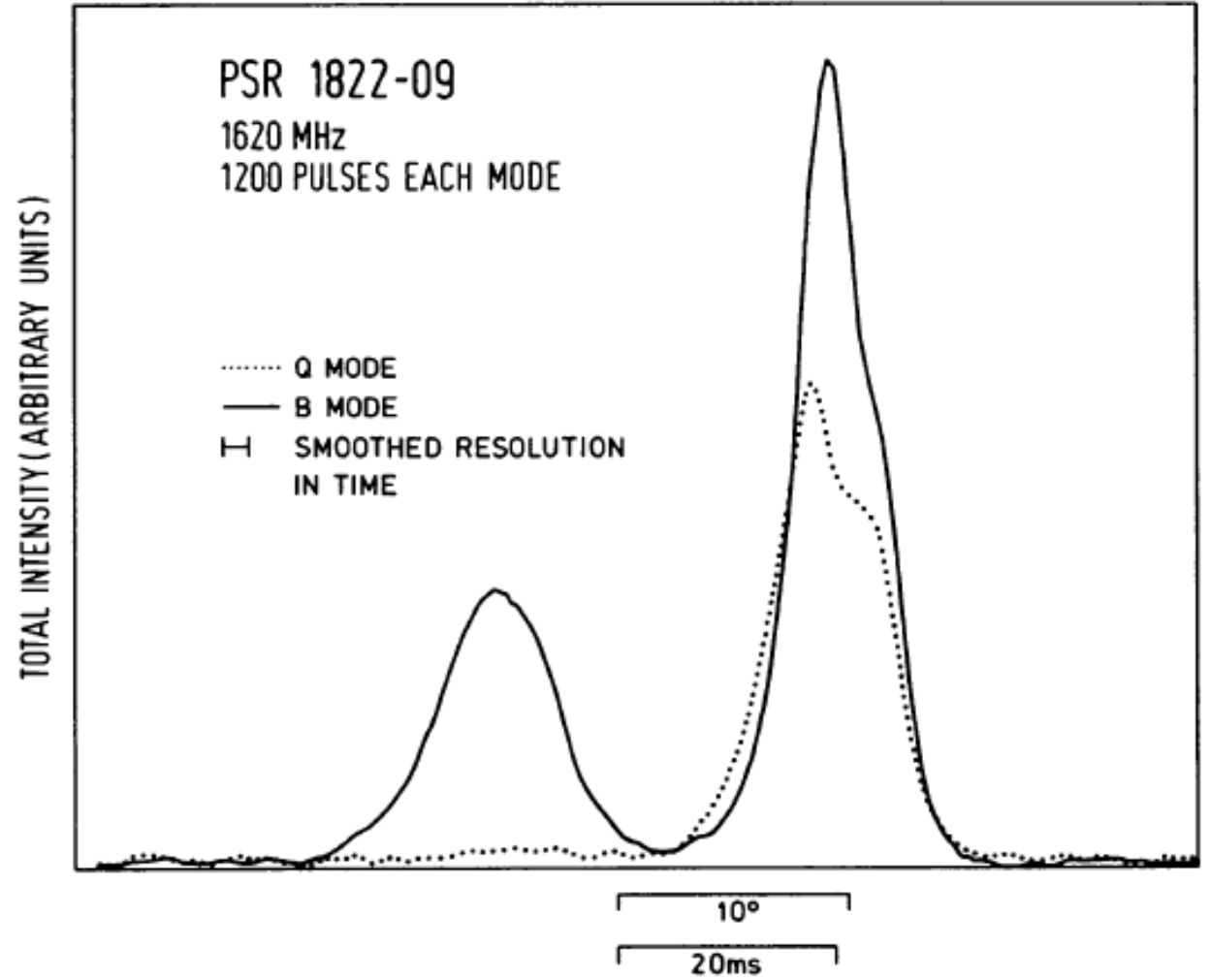
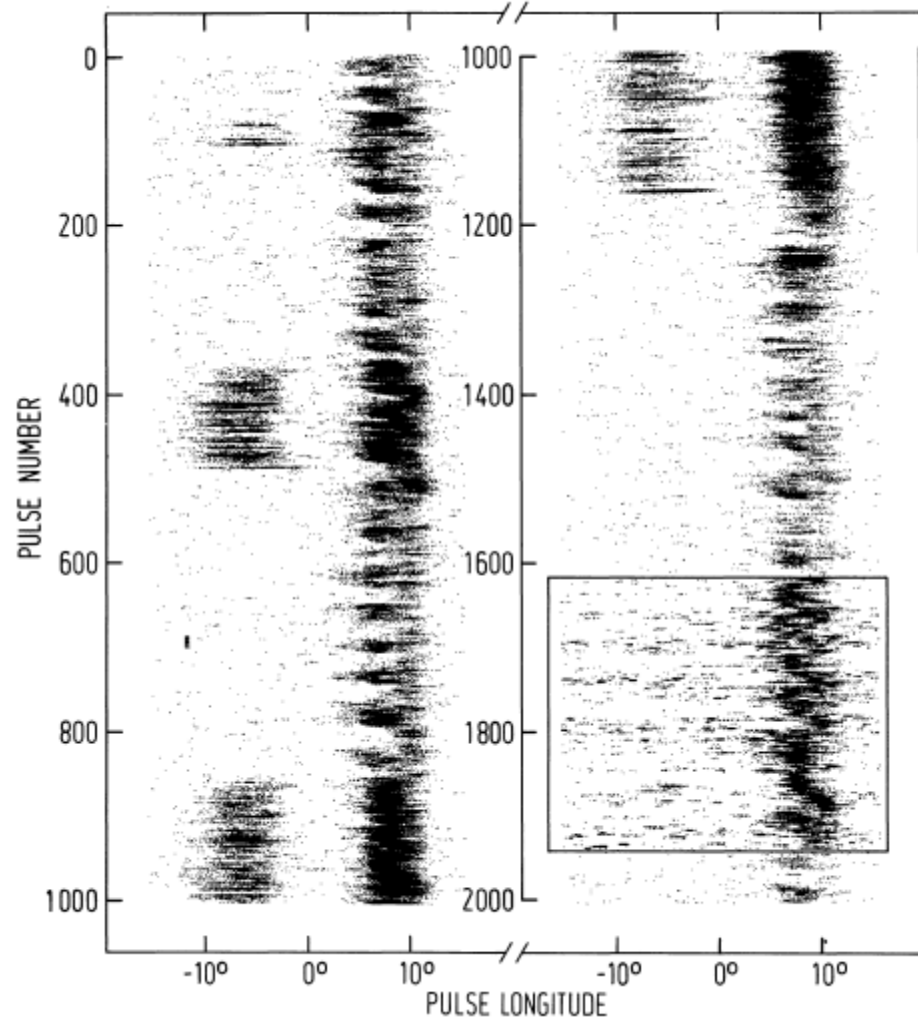
J1825-0935



- Mode changing
- IP-MP1 anticorrelation
- Periodic subpulse modulation

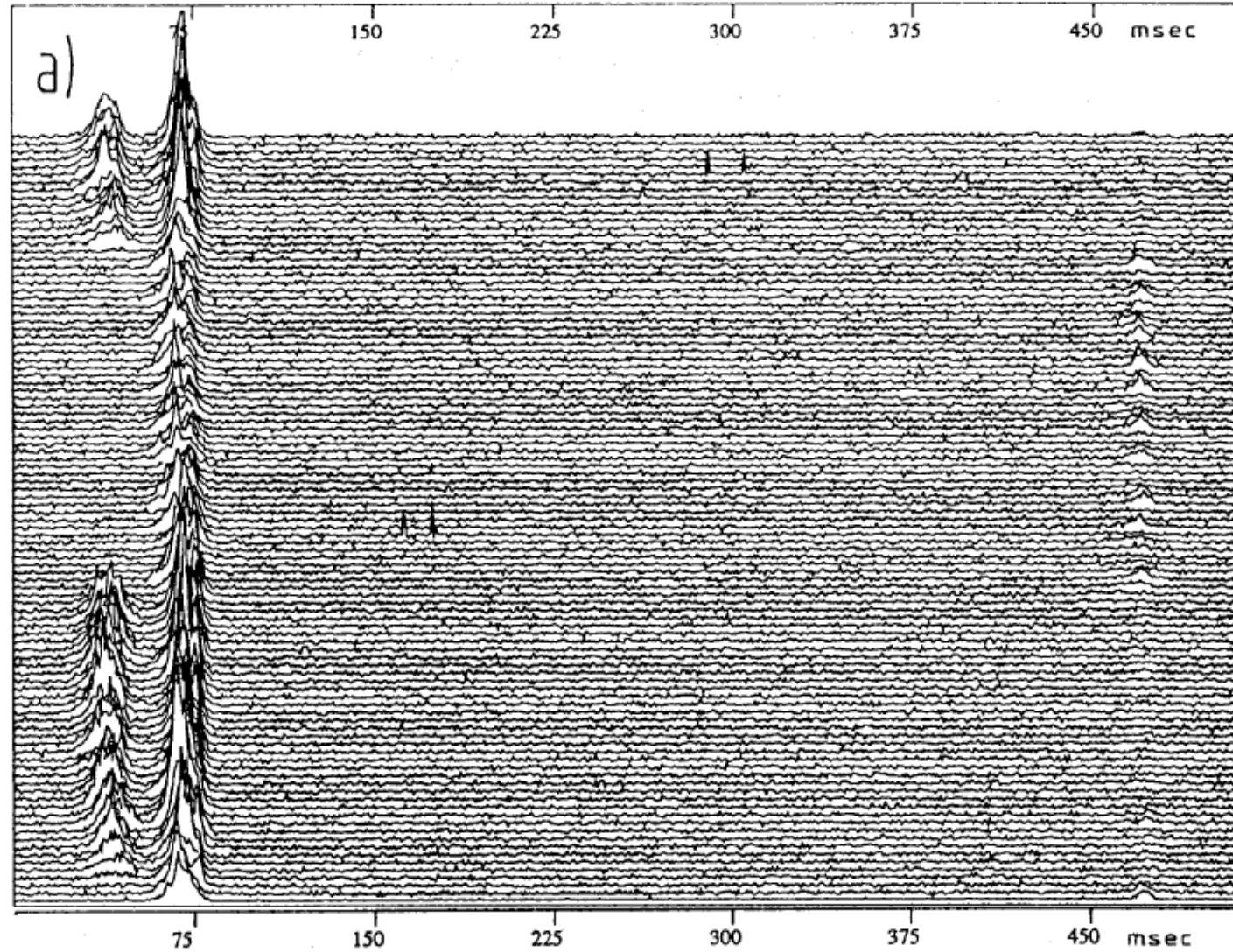


J1825-0935 --- mode changing



Fowler et al. 1981

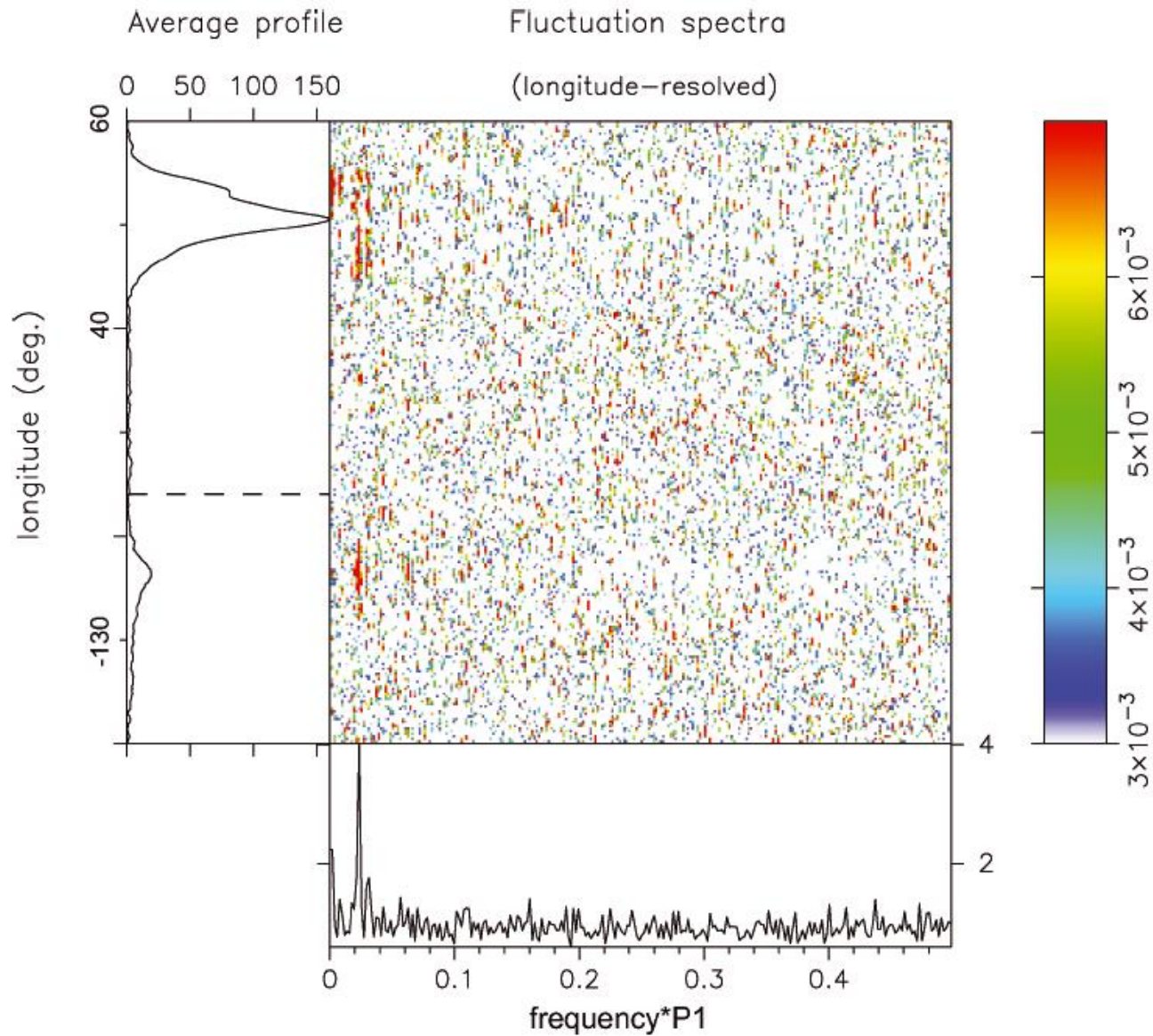
J1825-0935 --- IP-MP1 anticorrelation



LONGITUDE (°)

Gil et al. 1994

J1825-0938 --- Periodic Q-mode modulation



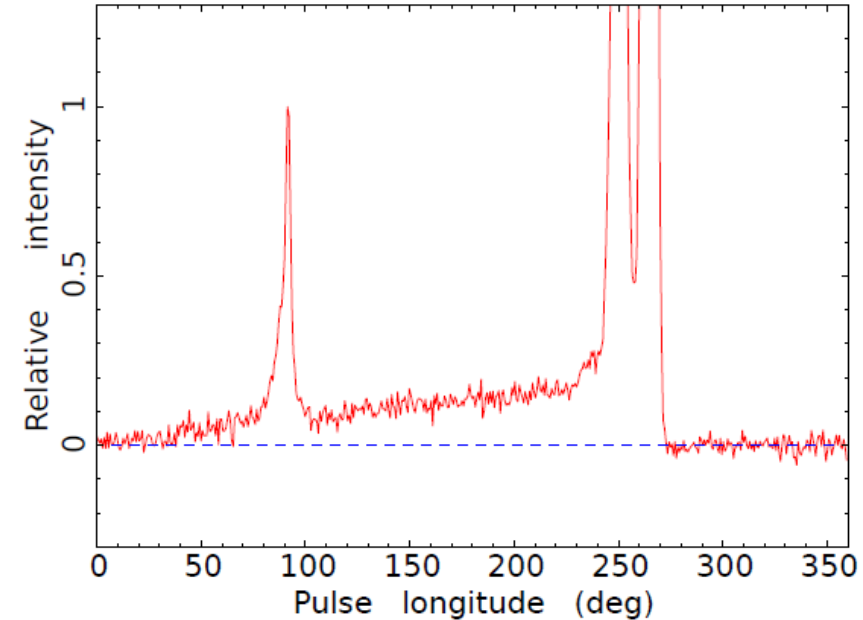
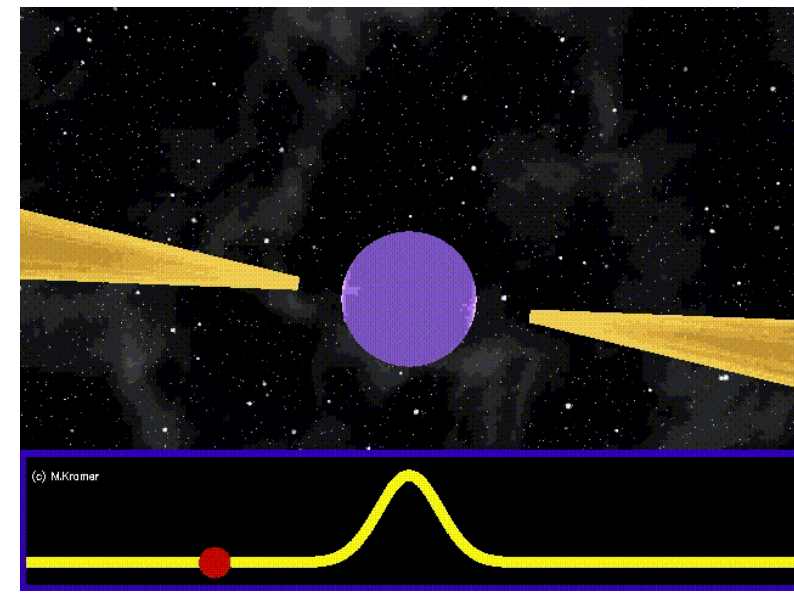
Observations

- Parkes 64-m radio telescope
- Center beam of the 20 cm Multibeam receiver
- PDFB 3 & 4 backend systems, search mode
- freq: 1369 MHz
- bw: 256 MHz
- nchan: 512
- tsamp: 256 μ s
- duration: 8 min
- 12 epochs (2012/09 – 2014/08)

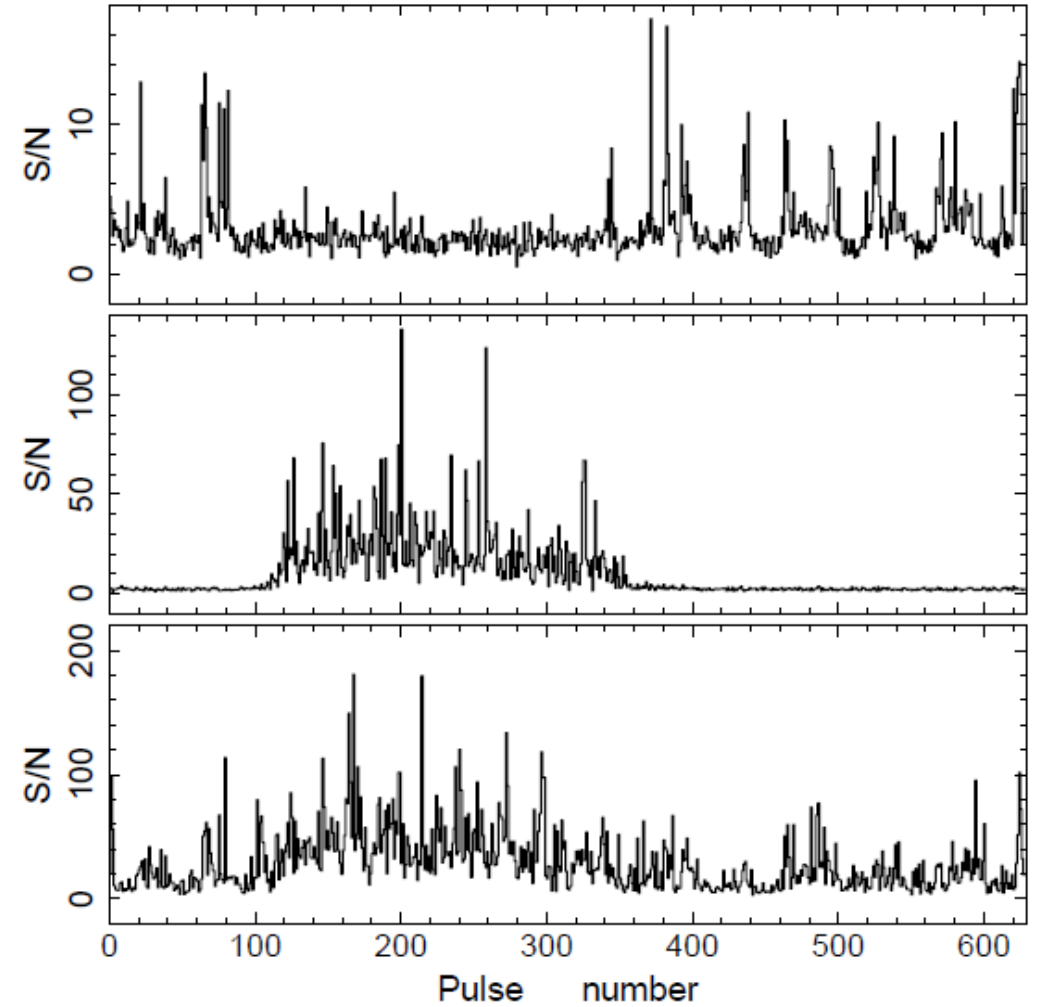
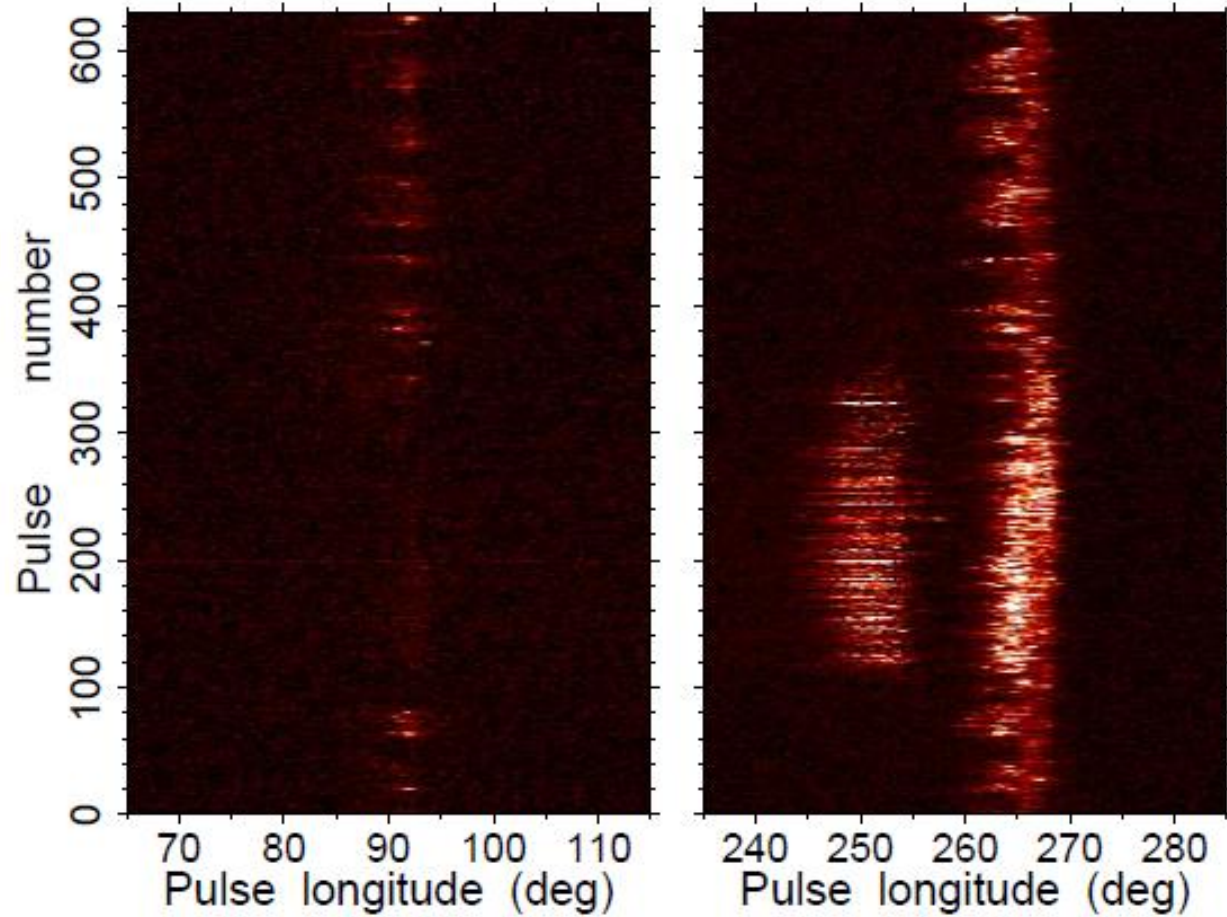


Emission geometry

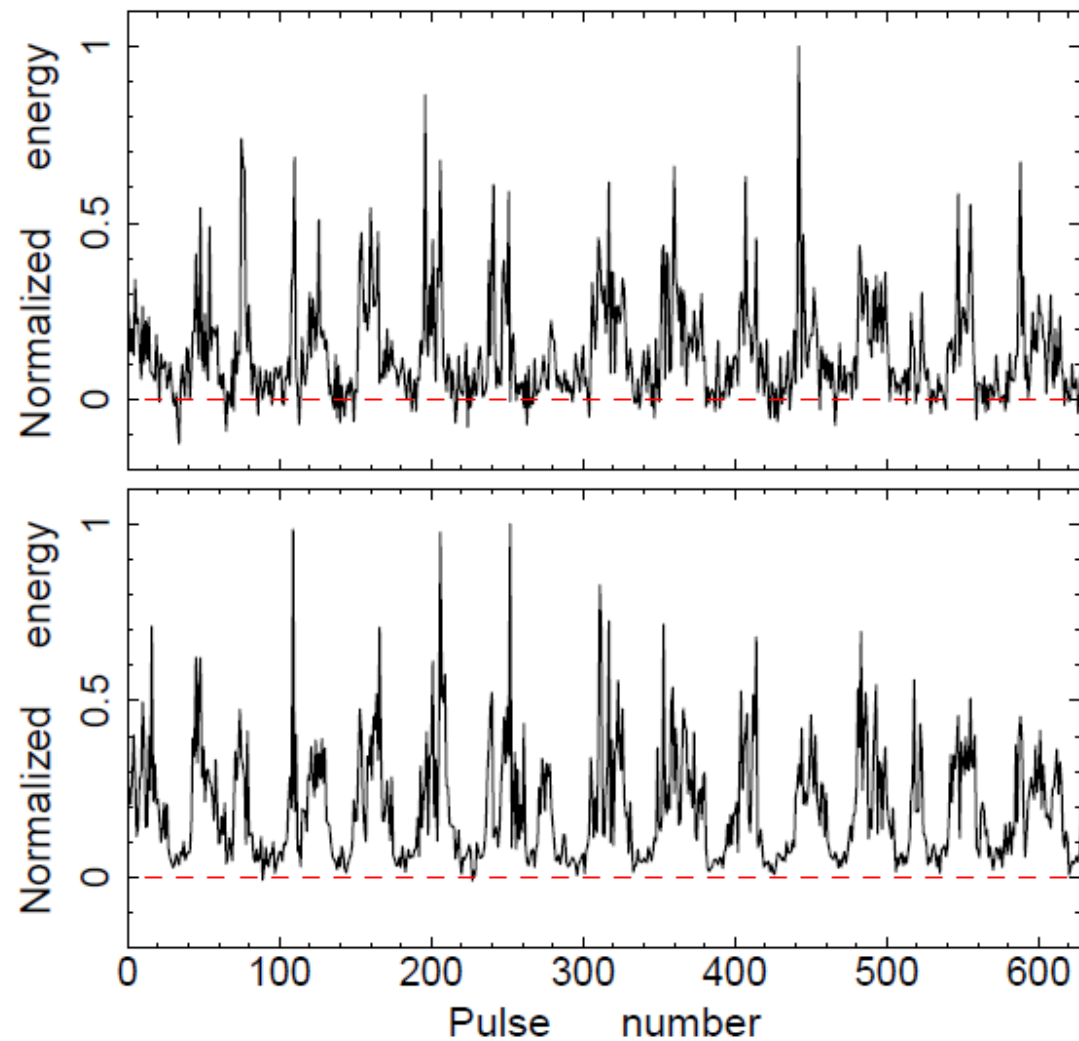
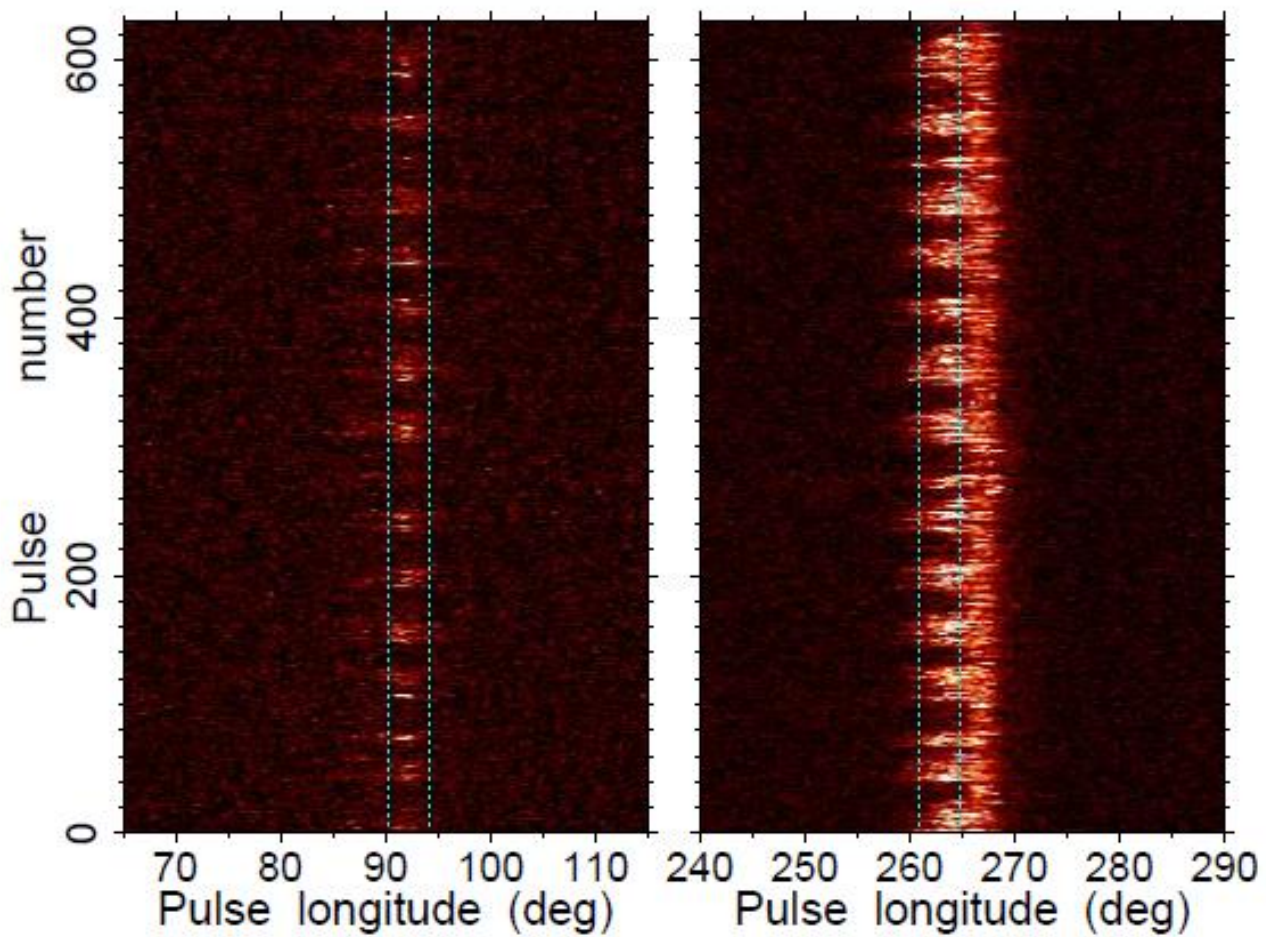
- interpulse: one pole or two pole?
- There had been no definitive observational evidence for the orthogonal geometry.
- The orthogonal geometry cannot explain both the IP-MP1 anticorrelation and the periodic Q-mode modulation which modulates the IP and the MP2 at the same period.
- The bridge of emission directly and strongly supports the single-pole model.



The IP-MP1 correlation

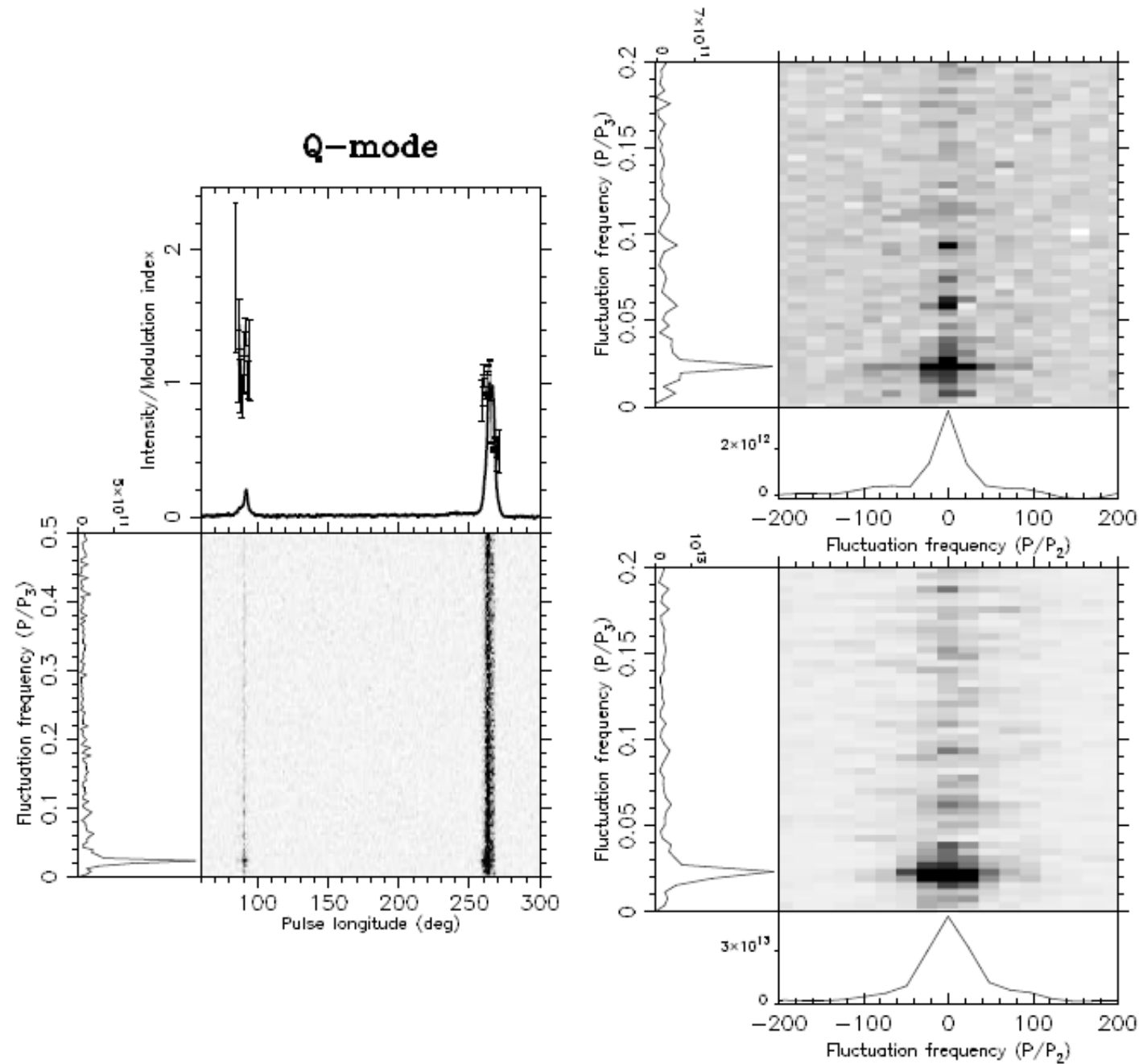


Periodic Q-mode modulation



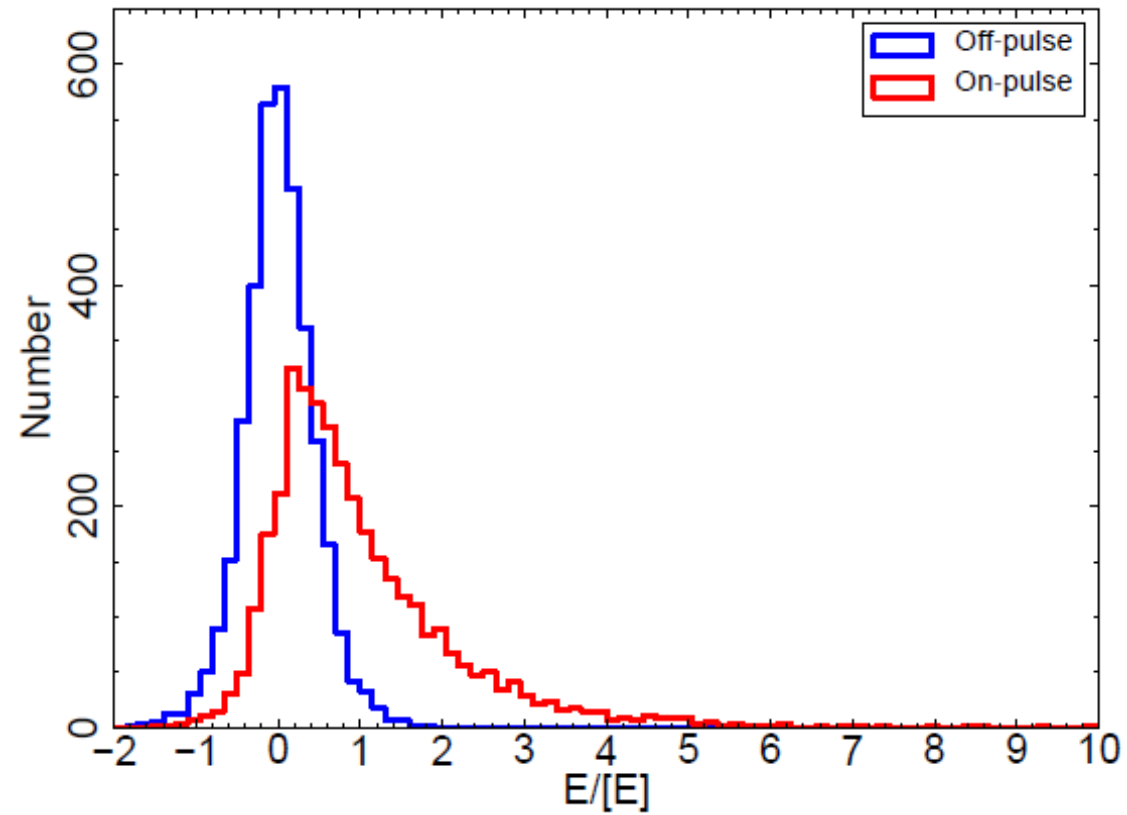
NF= $16.3 \pm 9.3\%$

Periodic Q-mode modulation



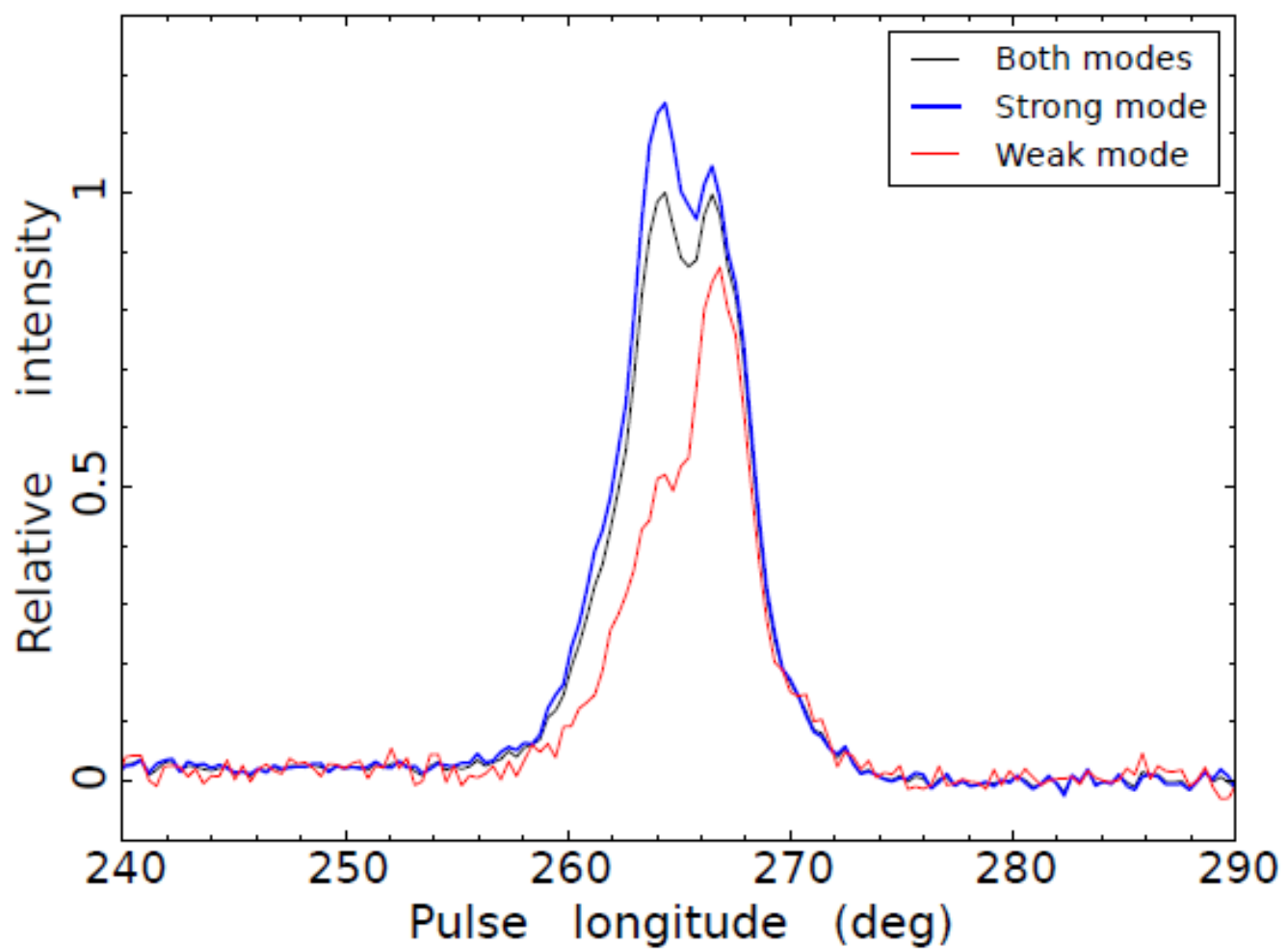
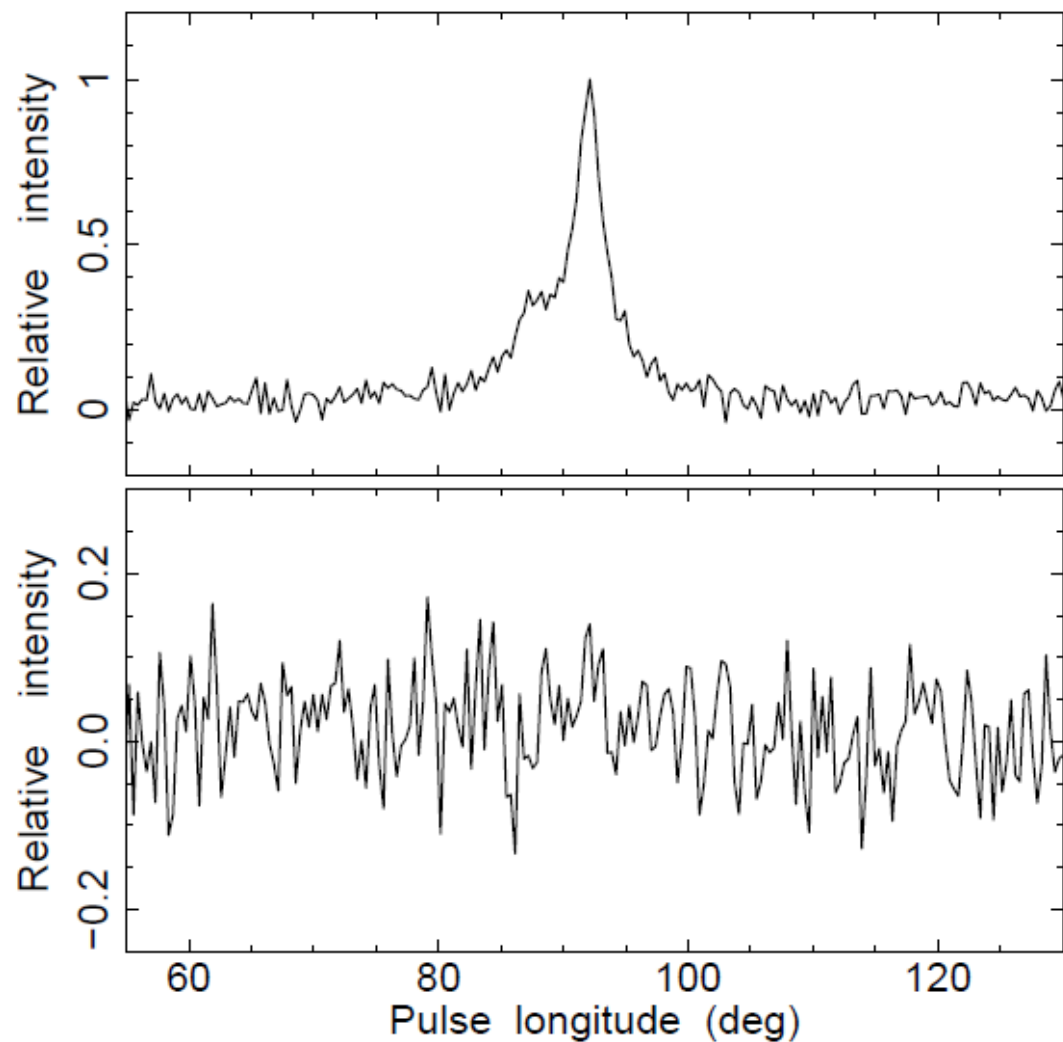
43- P_1

Periodic Q-mode modulation



NF=16.3 ± 9.3%

Periodic Q-mode modulation



Summary

- We report on single-pulse observations of PSR J1825–0935 that were made using the Parkes 64-m radio telescope with a central frequency of 1369 MHz.
- We provide clear evidence for the bridge emission between the IP and the MP, which strongly supports the single-pole models for PSR J1825–0935
- The well-known IP-MP1 anticorrelation is confirmed in our results.
- The periodic fluctuation that modulates both the interpulse and the main pulse at the same period is periodic nulling occurring in the interpulse and periodic partial nulling occurring in the main pulse.
- Q-mode modulation period: $\sim 43\text{-}P_1$, $\text{NF} = 16.3 \pm 9.3\%$.

THANKS!