

81 New Candidate Fast Radio Bursts in Parkes Archive

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Abstract

We have re-processed the 1997 to 2001 observations data of Parkes and have got a database called Parkes Transient Database (PTD). In order to identify all pulses, we introduce artificial intelligence (AI) algorithm to our searching pipeline. After processing all pulses in database, we finally find 81 new candidate FRBs.

Methods and results

1. Methods.

- 568,736,756 pulses with S/N larger than 7 were recorded in PTD.
- Namely FRBs are claimed as detection with $S/N \geq 10$, otherwise we refer to them as candidate FRBs.
- A deep residual network (ResNet) model is used to identify these pulses.

2. Results.

- 5 published FRBs and 81 new candidate FRBs are found from PTD.
- Candidate FRBs' DM range from 64 pc cm^{-3} to 1131 pc cm^{-3}
- Candidate FRBs' peak flux range from 0.05 to 0.33 Jy.

Statistical analysis

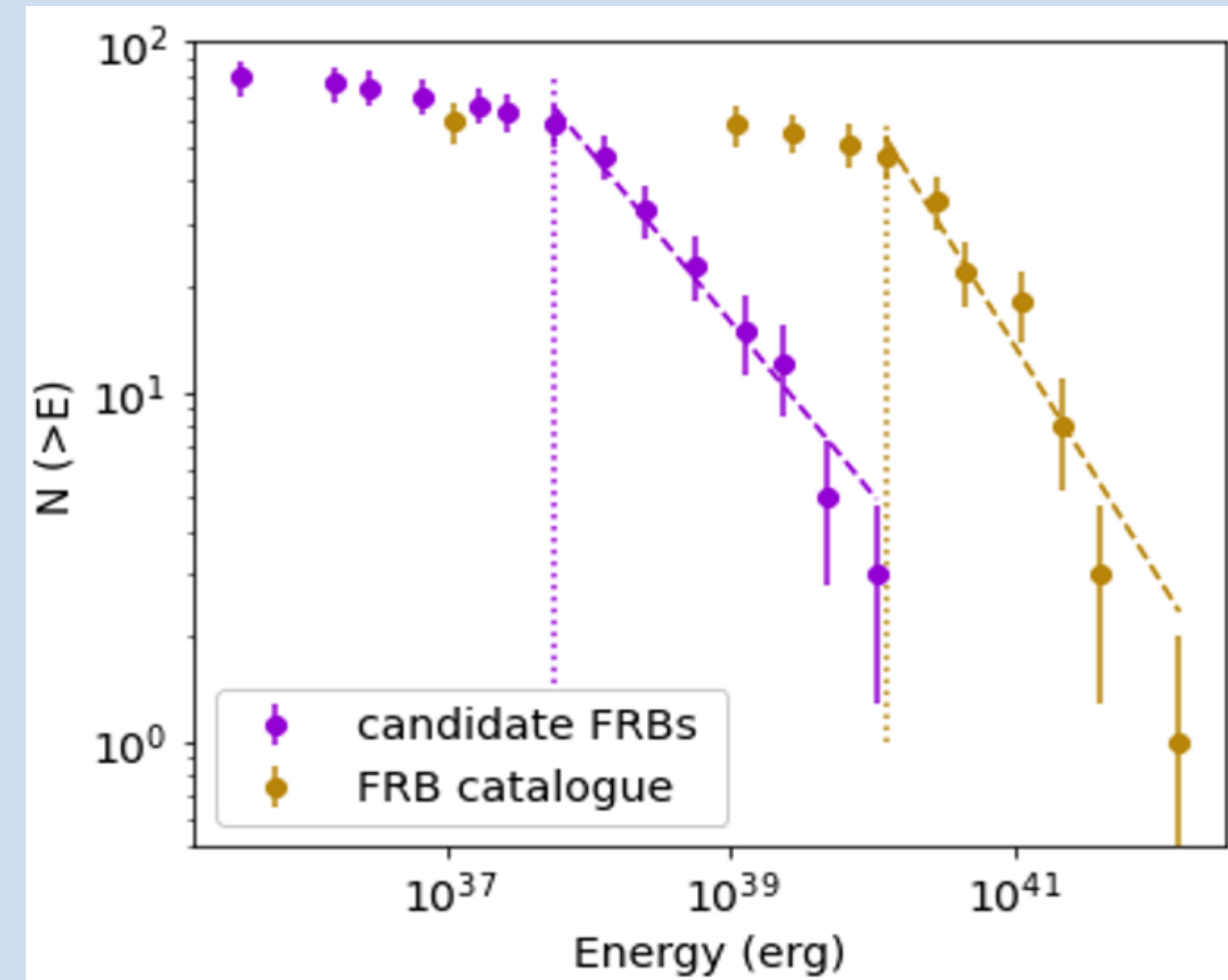


Figure 1. The cumulative distribution of the isotropic energy and width of the candidate FRBs versus the FRB catalogue. Power-law distribution have been fitted to the tails. The vertical lines represent cut-off energies and cut-off widths. Candidate FRBs isotropic energy: $\alpha = -1.5 \pm 0.1$, FRB catalog isotropic energy: $\alpha = -1.6 \pm 0.1$.

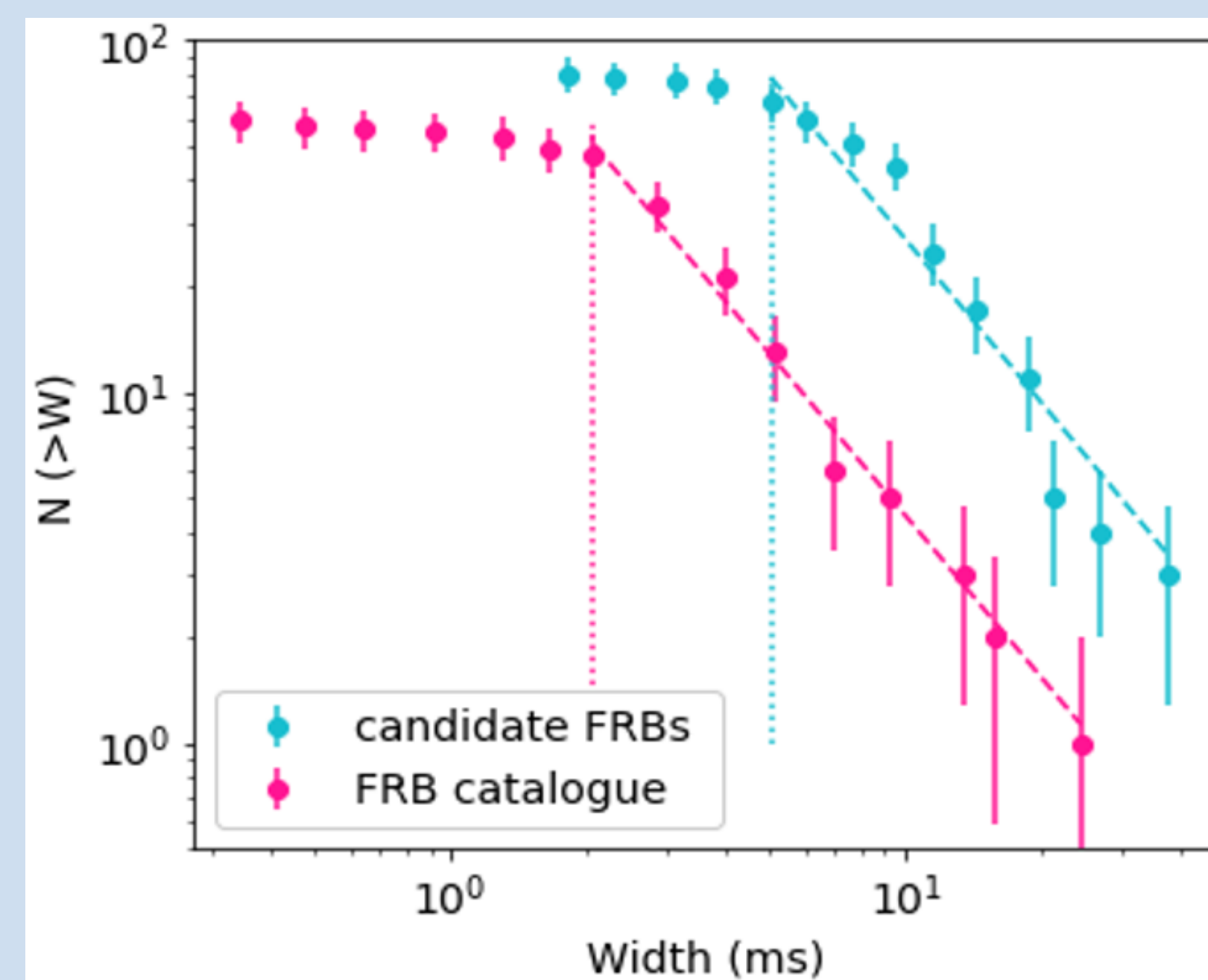


Figure 2. Candidate FRBs width: $\alpha = -2.6 \pm 0.1$, FRB catalog width: $\alpha = -2.5 \pm 0.1$.

Three examples of the 81 candidate FRBs

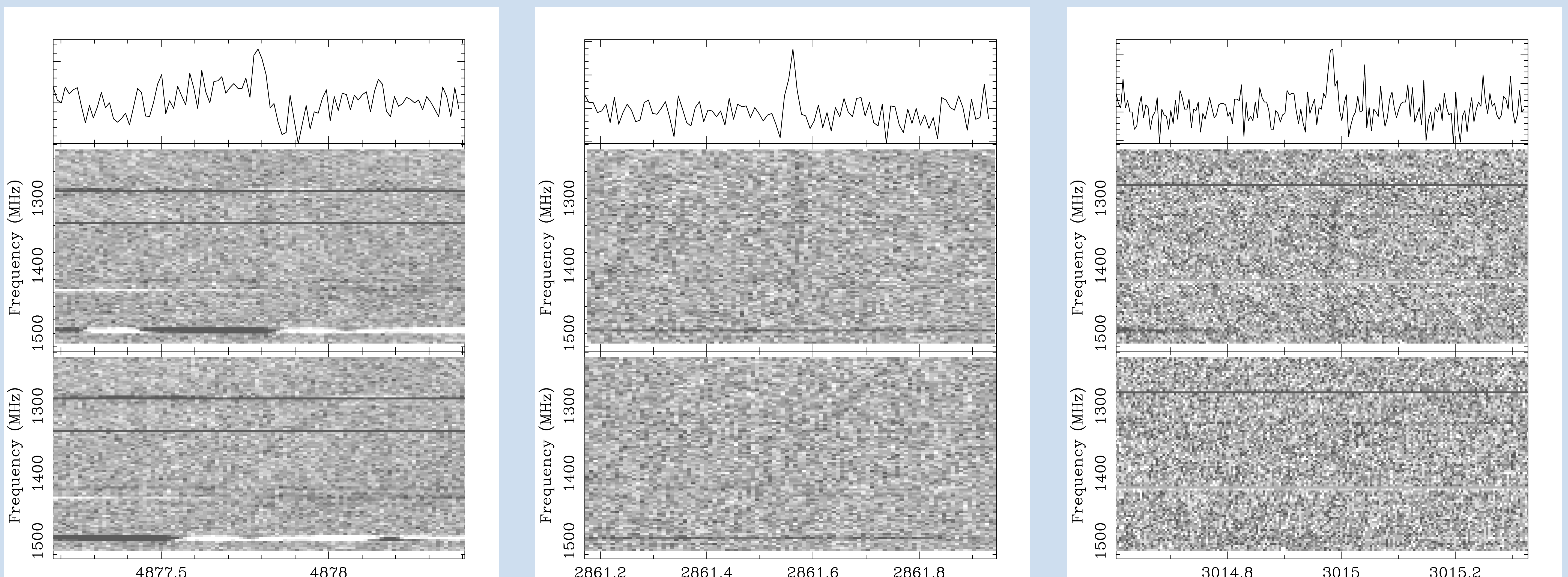


Figure 3. Pulse profiles of three example candidate FRBs detected in Parkes data archive. From left to right, the S/N of these candidate FRBs are 7.5, 8.0, 8.1, respectively.