

RFI excision – methods and issues

Meant to start discussion, not  
provide definitive answers!

First, need to identify RFI, then figure out how to remove it.

Eg Dick's talk: TV broadcasts from known direction can be “easily” identified and measured, so signal can be subtracted.

Reference antenna methods useful elsewhere? Pointing at Jy lab, PR radars?

Helpful for searching as well as timing?

Zapping can of course be done for individual channels and dumps after detection/folding.

This is effective, but time-consuming and does zap good data along with the RFI.

Simple-minded zapping done in Mark IV,  
a long time ago.

Narrowband: do short ffts, get power spectra,  
apply short-distance median filtering, various  
neighbour tests to identify bad regions of  
spectrum. Zero out the corresponding parts  
of the chirp function; update ~every second.

Simple-minded zapping done in Mark IV,  
a long time ago.

Broadband: look for spikes at some level  
above median of binned-down data buffer;  
set those samples to zero.

Is all of this a good idea? Looks like it helps flatten the baseline and improve the SNR. Dick says, “Pulsar signal under RFI is recovered with no (evident) perturbation.”

Shouldn't we test this?

UBC summer student Angus Cherry has added the m4-style bbzap to the gasp code; it doesn't run at speed (yet) though.

Angus has also been working on simulating raw gasp data, to be written to disk as when we record eg double-pulsar data. Should be able to produce gaussian, square, multi-gaussian profiles with arbitrary  $P$  and  $DM$  – not quite working yet! (Phase drifts, as-yet-not-understood artifacts on edges of square pulses...)

Goal: simulate data with and without broadband rfi added, process with and without zapping, and investigate quantitative effects on TOAs.

Could also be adapted to simulate scattering, etc. to look into acceptable approaches.