Common Pulsar Data Reduction Commands

- PRESTO
  - RFI Excision
    - Identify RFI and make a "mask"
      ```
      rfifind -o <output basename> -time 2 <filename>
      ```
  - Dedispersion
    - Create a single dedispersed time series, using an RFI mask
      ```
      prepdata -o <output basename> -mask <rfifind mask> -dm <DM> <filename>
      ```
    - Create many dedispersed time series over a range of DMs
      ```
      prepsubband -mask <rfifind mask> -lodm <low DM> -dmstep <DM step size> -numdms <total number of DMs> <filename>
      ```
  - Folding
    - Fold data using a TEMPO parfile in preparation for measuring TOAs
      ```
      prepfold -timing <parfile> <filename>
      ```
    - Fold data using a TEMPO parfile, but allow optimization of input parameters
      ```
      prepfold -par <parfile> <filename>
      ```
    - Fold data using period and DM specified on command line
      ```
      prepfold -p <period> -dm <DM> <filename>
      ```
    - Fold data using period and DM specified on command line, but without optimization of input parameters. The output can also be used to measure TOAs
      ```
      prepfold -p <period> -dm <DM> -nosearch <filename>
      ```
  - TOAs
    - Fit Gaussians to a profile. After fitting, copy the output to a file called
      ```
      gaussians.txt
      pygaussfit.py <prepfold bestprof filename>
      ```
    - Measure TOAs using Gaussian template
      ```
      get_TOAs.py -s <number of frequencies> -n <number of integrations> -g gaussians.txt <prepfold pfd filename>
      ```

- fold_psrfits
  - Fold PSRFITS search-mode data, producing a folded PSRFITS file
    ```
    fold_psrfits -b <number of profile bins> -t <sub-integration length> -P <parfile> <filename>
    ```

- dspsr
  - Fold PSRFITS search-mode data, producing a folded PSRFITS file
    ```
    dspsr -O <output filename> -b <number of profile bins> -E <TEMPO2 parfile> -A -L <sub-integration length> -a psrfits -e fits <filename>
    ```

- psrchive
  - RFI Excision
    - Automatically remove RFI
      ```
      paz -e zap -r <filename>
      ```
    - Interactive RFI removal tool
      ```
      pazi <filename>
      ```

- Plotting
  - Plot a summed profile in total intensity
    `pav -DFT <filename>`
  - Plot a summed profile with polarization information
    `pav -SFT <filename>`
  - Plot phase vs frequency
    `pav -GTpd <filename>`
  - Plot phase vs time
    `pav -YFpd <filename>`
- Calibration
  1. Collect pulsar observation, noise diode calibration scan, on-source fluxcal scan, and off-source fluxcal scan in the same directory
  2. Modify the fluxcal scan types (not always necessary)
     `pam -m --type FluxCalOn <fulxcal-on filename>`
     `pam -m --type FluxCalOff <fluxcal-off filename>`
  3. Create a flux calibrator
     `fluxcal <fluxcal-on filename> <fluxcal-off filename>`
  4. Create a database of observation attributes
     `pac -wp . -u fits -u fluxcal`
  5. Calibrate
     `pac -cTxd database.txt <pulsar filename>`
- Get TOAs
  - Sum over time, frequency, and polarizations in preparation for making a template
    `pam -e scr -FTp <filename>`
  - Make a smoothed template from observed data
    `psrsmooth <summed filename>`
  - Get TOAs, one TOA per frequency channel and sub-integration
    `pat -f princeton -s <smoothed template filename> <filename>`
    Note: Use the `-F` flag to sum over frequency