Spectral Line Data Reduction Tasks

Raw Reduction Step – Raw reduction forms “main” and “reference” spectra and produces a calibrated, reduced spectrum by differencing the “main” and “reference”. All necessary header information is preserved. Methods are provided to manipulate spectral axis and scale spectrum for additional calibration steps.

- Document the Data Collection Procedures – What does each procedure do? What are the necessary “setup” parameters?
  - Calibration
  - PS
  - BS
  - Grid Mapping
  - OTF
- Document the Raw Data Files – What information in each type of file?
  - IFProc Files
    - Variable Definitions
    - Main/Ref Information (“BUFPOS”)
    - Frequency Axis Information – document velocity/frequency scales (see writeup)
    - Sky Location Information – document conversion of telescope position to pixel position (see writeup).
  - Roach Files
    - Variable Definitions
    - Conversion of Timing to Telescope Position
    - Timing Alignment Procedures
- Document Raw Reduction S/W – What is the present system?
- S/W to view the result of a Raw Reduction.
- Consider: edit of “bad data” (e.g. remove bad individual on-off's in a PS/BS etc.)
- Review and Improve Raw Reduction S/W

Line Reduction Step – Beginning with result of “Raw Reduction” step, there are a number of algorithms to be applied to the spectral line data to achieve final results. Allow averaging of data. Allow merging of individual observations.

- Document Requirements (see writeup)
- Document existing approach in python
- Select a format for output of reduced spectra; write S/W to do this.
- Consider: does this need to be done in C too?
- Review and Improve Line Reduction Step

Pointing Maps – Using reduced line information, create a “pointing map” of a line property derived from fitting spectral lines.

OTF Mapping – The steps necessary to create an OTF data cube.

- Setup
- Raw Processing Step
- Line Reduction Step
- Write intermediate results: “SpecFile”
  - Is the “SpecFile” useful for
  - File type (nominally NetCDF).
  - Identify necessary “header” variables for analysis.
- View and Analyze the “SpecFile”
  - Identify desirable “views” of the data file (e.g. waterfall plots)
  - What analysis steps? (e.g. fit baselines?, review rms results)
- Grid the spectra to form a cube (currently done in C)
  - Identify all program options (weighting, convolution, filters, etc.)
  - Provide option to merge SpecFile's or Add new data to the cube.
  - Define and document the output data cube
  - Output format for data cube (nominally FITS with nominal WCS)
- View and Analyze the Data Cube