Astroinformatics School 2009

ASAP Component on Friday 17 April 2009

Tutorial 1 – Data Reduction for single spectrum

Prepared by: Kate Brooks

File Information:

tut1-kjb.txt	List of commands
2008-03-12_0932-M999.rpf	Data file (1.1 Mb)

Data Log:

ON-OFF Position switching mode with Mopra

2 Scans (1 OFF and 1 ON)

1 MOPS Zoom band

Instructions:

1. Work through the list of commands given in the text file to calibrate data taken with the Mopra telescope. Commands should be typed line-by-line into ASAP. Seek help from the tutors if there are any commands you don't understand.

2. Write a python script to automate the calibration procedure used in step 1. Your python script should permit interaction with the plotter and should be executed in a terminal (and not within ASAP) with the following command:

   localhost> python -i myscript.py

Estimated time to complete ~ 20 mins

To start ASAP type the follwing at the command line prompt

```
asap

# Load data file into memory and view description
s = scantable('2008-03-12_0932-M999.rpf')
print s

# Set the plotting mode
plotter.set_mode(stacking='i', panelling='t')

# Plot all raw data
plotter.plot(s)

# Set the doppler convention
s.set_doppler('RADIO')

# Set the rest frame
s.set_freqframe('LSRK')

# Set the observed rest frequency in Hz
s.set_restfreqs([86243.37e6])

# Define the channel unit
s.set_unit('km/s')

# Form the quotient spectra
q=s.auto_quotient()

# Average all scans in time, aligning in velocity
# Note: That for this dataset there is only 1 scan and so this
step is redundant
av = q.average_time(align=True)

# Average the two polarisations together
iav = av.average_pol()

# Plot the spectrum
plotter.plot(iav)

# Remove the baseline (set to 0 order). Specify the signal-free
channels
msk = iav.create_mask([-200,-50],[50,180])
iav.poly_baseline(msk,0)
plotter.plot(iav)

# Smooth the data with boxcar, full width = 3
siav = iav.smooth(kernel = 'boxcar', width = 3, insitu = False)
plotter.plot(siav)

# Scale the data according to scaling fudge factor
# Eg. With beam efficiency of 0.49 at 86 GHz
iav.scale(2)

# Make final plot for saving
plotter.set_range(-20,30)
plotter.plot(siav)
plotter.set_legend(mode=-1)
plotter.set_title(['Orion-SiO'], fontsize=18)
plotter.text(10,95,"SiO (2-1 v=1) at 86243.440 MHz", fontsize=12)
```

```
plotter.text(-19,95,"2008/03/12", fontsize=12)
plotter.text(-19,90,"Zoom Mode", fontsize=12)

# Save plot as postscript file
plotter.save('Orion-SiO.ps')
```