RSRO Final Report

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I was the RSRO resident and PI for projects 12A-184 (NGC 5253) and 12A-186 (IC 342). Through ECSO proposal 12A-462, I also received 8 hours of time to observe NGC 1569. I spent between January 31, 2012 and April 24, 2012 at the DSOC. The progress on my RSRO activities is detailed below.

1 PRIORITY 1

1.1 System testing

I developed a correlator configuration to observe multiple radio recombination lines at 5.0 and 6.75 GHz. This configuration has thirteen 16 MHz wide spectral windows with 256 channels for the lines and sixteen 128 MHz wide spectral windows with 128 channels for the continuum. The configuration was tested successfully using W49N, a bright Galactic HII region with strong RRL emission. I used this configuration to observe IC 342, my science source for project 12A-186. I will observe NGC 5253, my science source for 12A-184, and NGC 1569, the science source for my ECSO proposal 12A-462, in configuration CnB with the same correlator configuration.

I also assisted Joanna Corby, who will be an RSRO resident this summer, to develop a complicated correlator set up to observe multiple molecular lines.

1.2 OPT Quickstart guide

I developed an OPT quickstart guide for experienced observers. The initial draft of the guide was posted to the ECSV list. The draft was modified based on feedback from the ECSV list including Stan Kurtz, Deb Shepherd, Joanna Corby, Gustaaf van Moorsel, Miller Goss, and Heidi Medlin.

The final version of the OPT quickstart guide is now posted at evlaguides.nrao.edu[1] and linked from the OPT page on the EVLA website.

1.3 Line Stacking

I developed a method for stacking spectral lines as the same spatial position in CASA. The basic process is to use clean to regrid all the spectral line cubes to the same velocity grid, smooth them to the same resolution using imsmooth, and then average them with immath. This method is documented in casaguides→"Hints, Tips, and Tricks"→"Analysis"→"Stacking Multiple Spectral Lines at Same Position".[2]

1.4 CASA testing

I participated in the EVLA data reduction workshop. I attended the lectures and assisted users during the tutorials in the first half of the workshop.

I also participated in testing for the CASA 3.4 release. I tested auto-flagging using rflag, calibration routines, and cleaning using my C-band IC 342 data.

I typically use bright sources with unknown fluxes and spectral shapes for my bandpass calibration. If I do not correct for this unknown shape, it will be imprinted into my data. I developed a calibration strategy in CASA to use the flux calibrator to derive a model for the flux, spatial structure, and spectral shape of the bandpass calibrator. I use the model of the bandpass calibrator to calibrate the complex gain calibrator and the source. I documented this procedure in casaguides→"Hints,

[1] http://evlaguides.nrao.edu/index.php?title=Category:OPT-QuickStart

[2] http://casaguides.nrao.edu/index.php?title=Stacking_Multiple_Spectral_Lines_at_Same_Position

Tips, and Tricks"→"Calibration"→"Creating a Model for a Resolved Bandpass Calibrator".[3]

2 PRIORITY 2

2.1 Continuum Subtraction

I did not have time to do an extensive investigation of continuum subtraction. However, I did experiment with continuum subtraction while developing a line stacking technique.

My W49N test observations had a bright source off the phase center. This source appeared as a "hole" in the image when the continuum was subtracted in uv-space. The source was accurately subtracted when image continuum subtraction is used.

My science observations of IC 342 also had a bright source off the phase center. However, subtracting the continuum in uv-space worked well for these observations. These data were much fainter than the W49 data. However, they were also much more carefully calibrated and the slope of the bandpass calibrator accounted for in the calibration.

2.2 OPT Manual Rewrite

No progress.

[3] http://casaguides.nrao.edu/index.php?title=Creating_a_Model_for_a_Resolved_Bandpass_Calibrator