

## Initial Performance of a New 17–27 GHz Dual-Horn Receiver on the NASA 70 m Canberra Antenna

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A new dual beam, dual polarization, low noise receiver will be installed on the NASA 70-m antenna near Canberra, Australia in April 2015. It operates in five 2-GHz bands from 17 to 27 GHz *simultaneously*. The receiver temperature measured at the feed is 21–22K at 22 GHz and under good conditions, the system temperature at zenith is as low as 42K in the 21–22 GHz band. The native polarization is linear but can be converted to circular. The downconverters have complex mixers, followed by quadrature hybrids which can convert the quadrature phase channels into an upper and lower sideband, each 1000 MHz wide.

For spectroscopy, four ROACH signal processors each provide 32K channel spectra across four 1000 MHz bands, for 0.4 km/s velocity resolution at 22 GHz. In the 23–25 GHz band, the following 16 spectral lines were observed simultaneously in Orion KL: **NH<sub>3</sub>** 1<sub>1</sub>, 2<sub>2</sub>, 3<sub>3</sub>, 4<sub>4</sub>, 5<sub>5</sub>; **CH<sub>3</sub>OH** 2<sub>2,0</sub>-2<sub>1,1</sub> E, 3<sub>2,1</sub>-3<sub>1,2</sub> E, 4<sub>2,2</sub>-4<sub>1,3</sub> E, 5<sub>2,3</sub>-5<sub>1,4</sub> E, 10<sub>1,9</sub>-9<sub>2,8</sub> A, 9<sub>2,7</sub>-10<sub>1,10</sub> A; and **recombination lines** H64 $\alpha$ , H65 $\alpha$ , H81 $\beta$ , H83 $\beta$  and H93 $\gamma$ . In double Dicke mode test the receiver achieved a noise level of 7 mK r.m.s. in 30 minutes of integration and 31 kHz resolution.

The NASA 70-m antennas have a 45'' beamwidth at 22 GHz and an aperture efficiency of 50% giving a sensitivity of 0.7 K/Jy. This new system on the NASA 70 m antenna is a powerful for studying sources in the southern hemisphere. The telescope is available to guest observers through proposals submitted to ATNF and JPL, and to NRAO for joint observations.