

A NEW MULTIBAND RECEIVER FOR THE 12 M TELESCOPE AT THE ARIZONA RADIO OBSERVATORY (ARO)

LUCY M. ZIURYS, *Dept. of Astronomy, Dept. of Chemistry, Arizona Radio Observatory, The University of Arizona, Tucson, AZ, USA*; EUGENE F. LAURIA, GEORGE P. REILAND, *Arizona Radio Observatory, University of Arizona, Tucson, AZ, USA*; ARTHUR W. LICHTENBERGER, *Innovations in Fabrication Laboratory, University of Virginia, Charlottesville, VA, USA*; ANTHONY R. KERR, *Central Development Lab, National Radio Astronomy Observatory, Charlottesville, VA, USA*.

A new receiver has been constructed for the 12 m telescope of the Arizona Radio Observatory (ARO). The receiver package consists of four separate, dual polarization, frequency bands in a modular cryostat. The four bands cover the astronomically important atmospheric windows at 1.2, 2, 3, and 4 mm wavelengths. In the 3 mm and 1.2 mm wavelength regions, the receiver employs ALMA Band 3 (84 - 116 GHz) and ALMA Band 6 (211 - 275 GHz) sideband-separating (SBS) SIS mixers, while at 4 mm (67 - 90 GHz), cryogenic HFET amplifiers are used. Sideband separation for the 4 mm band is achieved through a room temperature E band downconverter developed at ARO. The 2 mm band (125 - 180 GHz) consists of SBS mixers developed from the device level by ARO in collaboration with the Central Development Laboratory (CDL) at the National Radio Astronomy Observatory (NRAO) and the University of Virginia Innovations in Fabrication Laboratory. The 2 mm window is accessible by a single broadband mixer, which covers all of ALMA Band 4 and 40% of ALMA Band 5. The mixer chip has a series array of four SIS junctions, similar to ALMA Bands 3 and 6. The new 2 mm mixers have typical noise temperatures less than 45 K with image rejection greater than 15 dB at most frequencies. The 2 mm mixers have proven to be exceptionally robust, with system temperatures around 100 K on the sky and with excellent baseline stability. The backend used for the receiver is the ARO Wideband Spectrometer (AROWS). AROWS is a digital Fourier transform spectrometer with a sampling rate of 10 Gs per sec, and can be configured to produce 2 x 4 GHz of continuous and usable instantaneous bandwidth. The digitizer card was developed by Curtiss-Wright. Two such cards can be used to generate 16 GHz of instantaneous bandwidth (4 x 4 GHz), allowing all four IF channels of any receiver band to be processed simultaneously for observations.