PERFORMANCE OF THE NEW 0.4 mm RECEIVER (602-720 GHz) AT THE SUB-MILLIMETER TELESCOPE OF THE ARIZONA RADIO OBSERVATORY

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A new 0.4 mm receiver has been commissioned for general use at the Sub-millimeter Telescope (SMT) of the Arizona Radio Observatory (ARO) on Mt. Graham, Arizona. The receiver architecture is dual linear polarization with 4 GHz of instantaneous IF bandwidth from 4-8 GHz and a frequency range of 602-720 GHz. The elemental mixers are double sideband (DSB) SIS junctions provided by the Space Research Organization of the Netherlands (SRON). These are the same devices used for Band 9 of the Atacama Large Millimeter Array (ALMA). Receiver equivalent noise temperatures range from 75 to 90 K (DSB) and the system temperatures are typically around 2,000 K with water vapor levels in the atmosphere less than or equal to about 2 mm. Main beam efficiencies at 690 GHz using Jupiter and Saturn as sources have been found to be 61 and 52 percent respectively. The performance of the SMT and receiver system at this wavelength, in terms of pointing, baseline stability, and beam shape, is excellent. Observations during the 2011 season have resulted in the detection of the CO (6-5) transition at 691 GHz in a young planetary nebula, NGC 6537 (Red Spider Nebula), with an intensity of 650 mK. The HCN (8-7) transition at 708 GHz was also observed towards R Leonis and in NML Cygnus, both with line intensities of about 100 mK.