ABSOLUTE FLUX CALIBRATIONS OF VENUS AND JUPITER AT 32 GHz

Mark S. Gatti, Michael J. Klein
Jet l'repulsion Laboratory
California institute of Technology
Pasadena, Ca 91109

The microwave flux densities of Venus and Jupiter at 32 GHz have been measured using a calibration-standard radio telescope system at the Owens Valley Radio Observatory (OVRO) during April and May of 1993. A preliminary analysis of these data suggests that the absolute accuracy of the results is of the order +/- 5% (0,2 dB). These measurements arc part of a joint JPL/Caltech program to accurately calibrate a catalog of other radio sources using the two bright planets as flux standards.

The calibration standard radio telescope at OVRO consisted of a 1.5-meter diameter offset feed cassagrainian reflector, with a dual beam Dicke radiometer. The antenna system including the radiometer feed horns were previously calibrated by the National 1 nstitute for Standards and Technology (NIST) in the near-field measurement facility. The antenna employed dual shaping for both the main and subreflectors yielding an efficiency of 80% for each of the dual secondary beams. The two antenna feeds are aligned in the horizontal piano so that atmospheric effects arc nearly identical for each beam on the sky.

The measurements are of high accuracy due both to the NIST calibrations and frequent radiometer calibrations during the observations. The dicke radiometer consisted of a state-of-thwart cryogenically cooled high electron mobility transistor (HEMT) amplifier and a high speed circulator switch. The total system temperature provi ded by the radiometer/antenna combination was 75 kelvin during the time of the observations.

An independent set of measurements of the two planets and the standard calibration radio sources Virgo A (3 C274) and DR 21 were made with a 34-meter diameter beam-wavcguidc antenna at the research and development station of NASA's Goldstone Deep Space Communication complex. These observations were made from April through July at 33.68 GHz using a total power radiometer that was calibrated frequently during each observing session. The ratio of the Venus/Jupiter fluxes from the OVRO and Goldstone measurements was highly correlated and the absolute magnitudes of the resultant flux densities are highly accurate. The results of the Goldstone observations will be used to enhance the radio source calibration work that will bc reported in the near future.

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Suggested for Commission J