CONSTRUCTION AND CALIBRATION OF A DIFFERENCE FREQUENCY LASER SPECTROMETER AND NEW THZ FREQUENCY MEASUREMENTS OF WATER AND AMMONIA

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A three laser system based on 852nm DBR lasers has been constructed and used to generate radiation in the 750 GHz to 1600 GHz frequency region. The system works by locking two of the three lasers to modes of an ultra low expansion Fabry-Perot cavity. The third laser is offset locked to one of the cavity locked lasers with conventional microwave techniques. The signal from the offset laser and the other cavity locked laser are injected into a Master Oscillator Power Amplifier (MOPA), amplified and focused on a low temperature grown GaAs photomixer, which radiates the difference frequency. The system has been calibrated with molecular lines to better than one part in 10^7 [a] In this paper we present the application of this system to the ν_2 inversion band of Ammonia and the ground and ν_2 states of water. A discussion of the system design, the calibration and the new spectral measurements will be presented.

[a] Shuji Matsuura, Pin Chen, Geoffrey A. Blake, J. C. Pearson and Herbert M. Pickett, IEEE MTT, in press (1998).