ATMOSPHERIC TRACE GAS ROTATIONAL LINESHAPE PARAMETERS NEAR 600 GHz

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The AURA-MLS mission will observe atmospheric trace gases with several radiometers. In support of this mission, the pressure and temperature dependence of the broadening and shift parameters for a variety of species must be measured and/or improved. This presentation will focus on recent measurements in the 600 GHz region.

Hydrochloric acid, an important stratospheric reservoir for chlorine, requires more precise measurement of the $J = 1 \leftarrow 0$ transitions of $H^{35}Cl$ and $H^{37}Cl$. In the course of making these measurements, the first experimental evidence for a pressure shift of this transition was found. The radical species BrO has several transitions in the detection window, and is expected to be measurable over long integration times. Since there are no published data on the pressure and temperature dependence of the bromine oxide lineshape a systematic study of several different rotational transitions has begun. Similar measurements of another radical species, HO_2, crucial to understanding the HO_x cycles of the stratosphere, are being made. Furthermore, a strong O_3 transition must be thoroughly analyzed.

Laboratory measurements utilize directly synthesized radiation produced through successive multiplication of a frequency synthesizer, pumping an active sextupler followed by a passive anti-parallel planar Schottky multiplier to generate the 500-700 GHz radiation. A free-space cell equipped with a methanol-cooled jacket is employed to determine the lineshape dependence upon nitrogen/oxygen pressure and temperature in the 0.2 mbar - 3.0 mbar and 208 - 300 K ranges.