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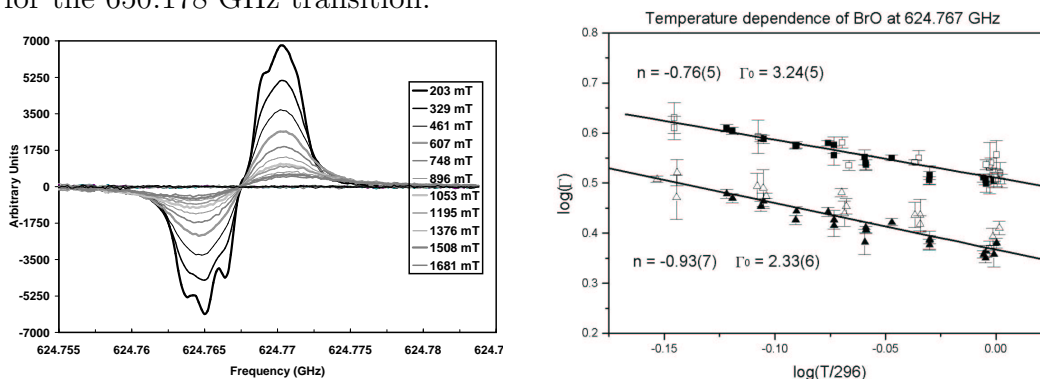
Submillimeter-wave Measurements of the Pressure Broadening of

BrO. M. M. Yamada, M. Kobayashi, H. Habara, T. Amano, B. J. Drouin, manuscript in press for HITRAN issue of JQSRT

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Summary

The N_2 and O_2 pressure broadening coefficients of the $J = 23.5 \leftarrow 22.5$ and $J = 25.5 \leftarrow 24.5$ rotational transitions in the ground vibronic state $X^2\Pi_{3/2}$ of ^{81}BrO at 624.768 GHz and 650.178 GHz have been independently measured at Ibaraki University and Jet Propulsion Laboratory. These lines are expected to be monitored by the Superconducting Submillimeter-wave Limb Emission Sounder in the Japanese Experiment Module on the International Space Station (JEM/SMILES) as well as the Earth Observing System Microwave Limb Sounder (EOS-MLS). This work provides temperature dependent pressure broadening parameters of BrO needed by the space station and satellite based observations. The BrO pressure broadening coefficients and their 1σ uncertainties are: $\gamma_0(N_2) = 3.24 \pm 0.05$ MHz/Torr and $\gamma_0(O_2) = 2.33 \pm 0.05$ MHz/Torr for the 624.768 GHz transition at room temperature (296K). For the 650.178 GHz line, the results are: $\gamma_0(N_2) = 3.20 \pm 0.07$ MHz/Torr and $\gamma_0(O_2) = 2.41 \pm 0.06$ MHz/Torr. The temperature dependence exponents and their 1σ error are determined to be: $n(N_2) = -0.76 \pm 0.05$ and $n(O_2) = -0.93 \pm 0.06$ for the 624.768 GHz transition, and $n(N_2) = -0.84 \pm 0.07$ and $n(O_2) = -0.70 \pm 0.07$ for the 650.178 GHz transition.



(left)- JPL room temperature run of BrO in O_2 . (right)-The temperature dependence of BrO pressure induced halfwidths. Data from JPL (open symbols) and Ibaraki (filled symbols) are depicted. The squares represent N_2 broadening measurements and triangles represent O_2 broadening measurements. The solid lines depict the best fit to the data for each broadening gas.