

## MLS Scientific Publication

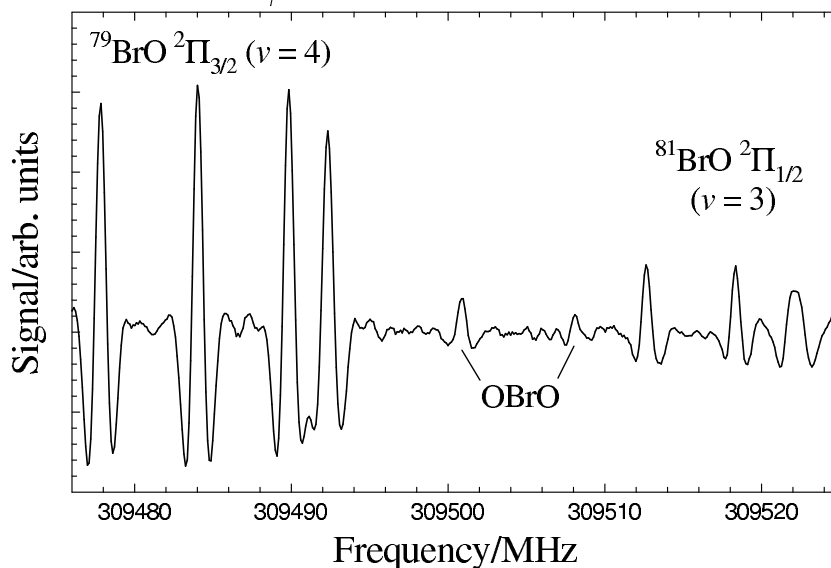
Scientific Themes: Atmospheric Chemistry, Submillimeter Spectroscopy.

**The rotational spectra, isotopically independent parameters, and interatomic potentials for the  $X_1^2\Pi_{3/2}$  and  $X_2^2\Pi_{1/2}$  states of BrO.**  
Drouin B.J., E. A. Cohen, C. E. Miller, H. S. P. Müller, *J. Mol. Spec.*, **205(1)**, p. 128, (2001).

**MLS contact:** B. J. Drouin, bdrouin@mail2.jpl.nasa.gov, (818) 393-6259

### Summary

Observations of the rotational spectrum of BrO have been extended to include vibrational levels up to  $v = 8$  in the  $X_1^2\Pi_{3/2}$  and  $v = 7$  in the  $X_2^2\Pi_{1/2}$  states. The rotational spectrum of isotopically enriched Br<sup>18</sup>O,  $X_1$ ,  $v = 0, 1$  and  $X_2$ ,  $v = 0$  has been observed as well. The spectra of all four isotopic species have been fit to a Hamiltonian in which the parameters have fixed isotopic ratios. An extensive set of isotopically independent parameters has been determined. Interatomic potentials have been derived for both the  $X_1$  and  $X_2$  states. The hyperfine constants and their vibrational dependencies have been determined more precisely and several of them have been determined for the first time. These are interpreted in terms of the electronic structure of the molecule. The isotope relations among the constants have provided a means of decorrelating the electron spin-rotation constant  $\gamma$  from the fine structure centrifugal distortion constant,  $A_D$ , and have allowed the first determination of an effective value for  $\gamma$ .



Comparison of  $v = 3$ ,  $X_2$  and  $v = 4$ ,  $X_1$  transitions observed in a DC discharge.