MICROWAVE DETECTION OF PROTONATED SO_2 IN TWO ISOMERIC FORMS

V. LATTANZI, M.C. MCCARTHY, and P. THADDEUS, *Harvard-Smithsonian Center for Astrophysics, 60 Garden St., Cambridge, MA 02138, and School of Engineering & Applied Sciences, Harvard University, 29 Oxford St., Cambridge, MA 02138*; SVEN THORWIRTH, *Max-Planck-Institut für Radioastronomie, Auf dem Hügel 69, 53121 Bonn, Germany*.

By means of Fabry-Pérot FT microwave spectroscopy, the rotational spectrum of protonated sulfur dioxide in two distinct isomeric forms, a *cis* and a *trans* geometry, is reported. Searches for both isomers were based on theoretical structures obtained at the CCSD(T)/cc-pwCVQZ level of theory corrected for zero-point vibrational effects at the CCSD(T)/cc-pV(T+*d*)Z level. At a similarly high level of theory, the *cis* isomer is calculated to be the global minimum on the potential energy surface, but the *trans* isomer is predicted to lie only a few kcal/mol higher in energy. The identification of *cis* $HOSO^+$ has been confirmed by detection of rotational lines of $DOSO^+$ and $HO^{34}SO^+$ at precisely the expected frequency shifts. Because sulfur dioxide is a well known interstellar and extragalactic species, and because it possesses a large proton affinity, $HOSO^+$ is a excellent candidate for radioastronomical detection.