LABORATORY DETECTION OF THE ELUSIVE $HSCO^+$ ISOMER

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The rotational spectrum of protonated carbonyl sulfide, $HSCO^+$, has now been detected in the centimeter-wave band in a molecular beam by Fourier transform microwave spectroscopy. Rotational and centrifugal distortion constants have been determined from transitions in the $K_a = 0$ ladder of the normal isotopic species, and $DSCO^+$ and $H^{34}SCO^+$. $HSCO^+$ is systematically more abundant by a factor of three than $HOCS^+$, the isomer obtained by attaching the H^+ to the other end of the molecule, which *ab initio* calculations long predicted to be higher in energy by 4-5 kcal/mol.
In addition, the rotational spectra of several other protonated species such as DCS^+ and $NNOH^+$, and complexes such as Ar-D_3^+, Ar-DCO^+, Ar-N_2H^+, etc. have been detected at somewhat higher spectral resolution than previously reported. These new measurements either better resolve or reveal additional line structure which is not observed in the lower resolution studies.