INFRARED SPECTRA OF $X^- \cdot H_2O$ (X=F,Cl,Br) IN THE 600-800 cm^{-1} REGION: UNDERSTANDING THE THREE-DIMENSIONAL CONFINEMENT OF THE SHARED PROTON

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Recent advances in nonlinear mixing technology have allowed us to obtain infrared spectra of the $X^- \cdot H_2O$ (X=F,Cl,Br) complexes in the 600-1800 cm^{-1} (16.7-5.6 μm) region. While transitions in this regime are typically associated with the three-dimensional confinement of the shared proton, unexpected spectral activity is observed. The out-of-plane vibrational overtone of the $Cl^- \cdot H_2O$ complex exhibits anomalous intensity, which is explained by a curvilinear motion of the proton. The $F^- \cdot H_2O$ spectrum shows evidence for Fermi interactions between several energy levels. Analysis of the spectra in the context of the potential surface probed by the shared proton is discussed.