EXPERIMENTAL CHARACTERIZATION OF THE He + $I^{35}Cl(E,v^{\dagger}=11,12)$ AND He + $I^{35}Cl(\beta,v^{\dagger}=0\text{-}2)$ INTERMOLECULAR POTENTIAL ENERGY SURFACES

JOSHUA P. DARR and RICHARD A. LOOMIS, *Department of Chemistry, Washington University, One Brookings Drive, CB 1134, Saint Louis, MO 63130*.

Two-photon excitation of the T-shaped and linear He$\cdots$$I^{35}Cl(X\,^1\Sigma^+,v''=0)$ complexes are used to access multiple intermolecular vibrational levels within the He + $I^{35}Cl(E0^+\ ^3P_2,v^{\dagger}=11,12)$ and He + $I^{35}Cl(\beta 1\ ^3P_2,v^{\dagger}=0\text{-}2)$ ion-pair state intermolecular potentials. The excitation utilizes different metastable intermolecular levels within the He + $I^{35}Cl(B\,^3\Pi_{0+},v'=2,3)$ and He + $I^{35}Cl(A\,^3\Pi_1,v'=15)$ potentials, and thus varying Franck-Condon windows, to access levels with varying amounts of vibrational excitation within the ion-pair state intermolecular potential. The He + $ICl(E,v^{\dagger}=11,12)$ and He + $ICl(\beta,v^{\dagger}=0\text{-}2)$ intermolecular potentials are found to be nearly identical with an overall minimum in the near T-shaped orientation and binding energies $D_0^{\dagger}$ = 40 cm^{-1}. Intermolecular stretching and bending frequencies are measured to be 25 and 13 cm^{-1}, respectively. Since common intermolecular levels are accessed by transitions from both the T-shaped and linear He$\cdots$$ICl(X,v''=0)$ ground state conformers, the relative binding energies of the conformers can be directly measured; the linear conformer is found to be 5.4(2) cm^{-1} more strongly bound than the T-shaped conformer.