

LASER SPECTROSCOPIC CHARACTERIZATION OF THE GROUND $\tilde{X}^1\Sigma_g^+$ AND EXCITED \tilde{A}^1B_1 STATES OF JET-COOLED LIOLI ("LITHIATED WATER")

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Various laser based spectroscopies, including R2PI (Resonance Two-Photon Ionization), LIF (Laser-induced Fluorescence), DF (Dispersed Fluorescence), and SEP (Stimulated Emission Pumping) have been utilized to determine several vibrational and rotational constants for the ground ($\tilde{X}^1\Sigma_g^+$) and first singlet excited state (\tilde{A}^1B_1) of $^7\text{Li}^{16}\text{O}^7\text{Li}$. From analysis of SEP spectra to $(\nu_1, \nu_2^\ell, \nu_3 = 0)$ vibrational states, the $^7\text{Li}^{16}\text{O}^7\text{Li}$ ground state is confirmed to be linear, with a bond length (R_0) of 1.611 ± 0.005 Å. The 1B_1 excited state is bent, with a bond angle of approximately 105° , and a bond length (R_0) of approximately 1.84 Å. These geometries are consistent with ab initio estimates, and with the idea that the bonding in both these states is essentially ionic ($\text{Li}^{+1}\text{O}^{-2}\text{Li}^{+1}$ and $\text{Li}^{+1/2}\text{O}^{-1}\text{Li}^{+1/2}$, respectively).