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 $^7Li^{16}O^7Li$. From analysis of SEP spectra to ($\nu_1, \nu_2^\ell, \nu_3 = 0$) vibrational states, the $^7Li^{16}O^7Li$ ground state is confirmed to be linear, with a bond length (R_0) of 1.611 $\pm$ 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 ($Li^{+1}O^{-2}Li^{+1}$ and $Li^{+1/2}O^{-1}Li^{+1/2}$, respectively).