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Photoassociation spectroscopy of long-range molecular states below the $2s + 3p$ $^6Li_2$ asymptote CHRISTIAN GROSS, SAPTARISHI CHAUDHURI, JAREN GAN, KAI DIECKMANN, Centre for Quantum Technologies, Natl Univ of Singapore — We present photoassociation spectra of high-lying vibrational states of the interatomic potentials correlating to the $2s + 3p$ asymptote of $^6Li_2$. Starting from an atomic cloud in a magneto-optical trap we first drive a free-to-bound transition into a molecular bound state using a tunable ultra-violet laser. Thereafter we ionize these long-range molecules using a 532 nm laser and detect the resulting ions with a channeltron. We determine the absolute positions of the transitions with MHz precision utilizing a frequency comb based calibration. Lithium dimers are extensively studied theoretically using various models and methods. Spectroscopic measurements are crucial to test and benchmark these methods and are available for various electronic states and inter-nuclear distances of $^6Li_2$ molecule. Our study provides the first experimental observation of long-range states of the $2s + 3p$ asymptote of $^6Li_2$.

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