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Precision spectroscopy of cold Li atoms using an optical frequency comb[1] JASON STALNAKER, SEAN BERNFELD, LEANNE SHERRY, ZWOI-SAINT MEARS-CLARKE, Department of Physics and Astronomy, Oberlin College — The atomic structure of lithium (Li) has aroused a significant amount theoretical and experimental interest as a system in which precision atomic calculations and spectroscopic measurements can be united to yield scientifically significant results. While there have been many experimental investigations of Li spectroscopy, particularly isotope shifts and hyperfine structure on the $2\,^2S_{1/2} \rightarrow 2\,^2P_{1/2,3/2}$ ($D1$, $D2$) transitions, they suffer from significant disagreements and systematic effects. We are in the process of developing an experiment to resolve the current discrepancies and improve on the accuracy of the spectroscopic measurements in Li. By combining the mature techniques of atom cooling and trapping with the extraordinary spectroscopic accuracy provided by optical frequency combs we anticipate that we will be able to measure the optical frequencies of the $D1$ and $D2$ transitions to an absolute accuracy of 5 kHz.

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