BLACKCHIRP: OPEN-SOURCE DATA ACQUISITION SOFTWARE FOR CHIRPED-PULSE FOURIER TRANSFORM MICROWAVE SPECTROSCOPY

KYLE N. CRABTREE, *Department of Chemistry, University of California, Davis, Davis, CA, USA*.

Since its development nearly 20 years ago, chirped-pulse Fourier transform microwave spectroscopy has dramatically changed the landscape of rotational spectroscopy. Its large bandwidth compared with cavity Fourier transform and frequency-modulation instruments affords a massive reduction in the time required to acquire spectra over a wide frequency range. Chirped-pulse instruments have been developed from the microwave through the millimeter wave spectral regions, and each instrument typically involves a unique combination of hardware (oscilloscopes, high-speed digitizers, waveform generators, etc), yet software for integrating these components into a common workflow has not been readily available. In this talk, I will introduce Blackchirp[a], an open-source, cross-platform (Windows, Mac, Linux) program designed to facilitate the acquisition of chirped-pulse data and which is currently used to control instruments at UC Davis, Harvey Mudd College, MIT, and the Harvard-Smithsonian Center for Astrophysics. Blackchirp has a modular architecture which supports many possible combinations of hardware, and new devices can be incorporated into the program with a small amount of C++ knowledge. It supports the traditional wideband acquisition mode as well as segmented LO-scanning acquisitions, and the collected data are displayed in an interactive format in real time during the acquisition. A Python package is available for reading in FID data collected by the program and for performing common processing tasks. This talk will provide an overview of Blackchirp's functionality and how to adapt the program to new hardware devices.

[a]Blackchirp and its documentation are available at https://github.com/kncrabtree/blackchirp