MODELING SIMULTANEOUS STARK AND ZEEMAN EFFECTS

WILTON L. VIRGO, KATHY J. CHEN and SARAH A. HYDE, *Department of Chemistry, Wellesley College, Wellesley, MA 02481.*

Theoretical calculations of shifts and splitting of atomic energy levels in simultaneously applied electric and magnetic fields are crucial for interpretation of experimental results relevant to plasma chemistry diagnostics. In this work, a theoretical method of calculating the combined Stark and Zeeman effects from simultaneously applied electric and magnetic fields will be presented. The research focus is on atoms with hyperfine structure such as Cs and Rb. Theoretical calculations have been developed using free, open-source software built on the Python programming language to model the hyperfine structure of free atoms in uniform electric and magnetic fields. Matrix representations of the Stark, Zeeman and Hyperfine operators have been constructed in spherical tensor form, and matrix elements have been evaluated in order to determine the energy level dependence on simultaneously applied electric and magnetic fields.