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**Towards better understanding of the Recoil-In-Vacuum technique: hyperfine interactions and their variation with element and ion charge state for application to g-factor measurements in ps lifetime nuclear levels.**

NICHOLAS STONE, Oxford University and University of Tennessee

The recoil-in-vacuum [RIV] method for excited state nuclear g-factor measurements in the ps lifetime range has been shown recently to offer attractive possibilities for application with RIBs combined with modern detector arrays. In the recent work, as in all prior RIV studies, the magnetic hyperfine fields acting at the nuclei of the recoiling ions have been treated empirically, calibrated using states of known lifetime and g-factor. It is now a matter of clear importance to establish how these fields vary with element and ionization state [dependent on beam energy and target thickness] in order to discover how the RIV approach may be best utilized. The ability to calculate lifetimes and hyperfine interaction strengths in complex electronic levels has advanced markedly with modern computation techniques. Physics ideas contributing to the selection of the electronic states of importance will be discussed and first evidence for the value of a-priori calculations presented. In collaboration with Jirina Rikovska Stone, Oxford University and the University of Maryland; Charlotte Froese Fischer, Vanderbilt University.