

Nuclear g factor measurement with Recoil-into-Vacuum method

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The recoil-in-vacuum (RIV) [1] is a method utilizing hyperfine interaction to measure the nuclear g factors for excited states with pico-second lifetimes. It has drawn a lot of attentions recently because of advantages over transient field (TF) method for applications to radioactive beams. The RIV was first introduced in the 1970's but was seldom used due to the difficulty in calibrating the hyperfine interaction. With the advanced atomic theory now available, the hyperfine interaction may be calculated from first principles. In this talk, I will introduce a new time-dependent Monte Carlo simulation method based on atomic-structure calculation package GRASP2K to extract g factors from RIV experiments. The method was tested by simulating previously reported g factors for which attenuation coefficients G_{ks} values were measured in RIV experiments. The g factors extracted from the simulations are in good agreement with the previously report values. This method can be widely used in different reactions that align the spins of the nuclear states. These reactions include Coulomb excitation, transfer reaction, fusion evaporation and fission. It will be particularly useful for future experiments radioactive beams. Examples shown in this talk are from Coulomb excitation and fusion evaporation.

References

[1] G. Goldring, *Hyperfine interactions in isolated ions* (North-Holland, Amsterdam, 1982), Vol. 3, p. 484.