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Magnetic moments of short-lived excited states at projectile-fragmentation energies. Would the recoil in gas technique work?

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Nuclear moment measurements of short lived excited states are in general very challenging due to the requirement to obtain strong enough magnetic fields, capable to provide a sizeable perturbation of the nuclear spin ensemble within the lifetime of the state of interest. Kilotesla's magnetic fields are usually needed for nuclear states of picosecond lifetimes. Hyperfine fields were often utilized for this purpose. Those fields could rarely be estimated from first principles and empirical calibrations are needed.
An approach that has been attempted for these measurements at projectile-fragmentation energies (tens to hundreds of MeV/u) is the Transient Field technique. However, even at relatively low energies (~40 MeV/u) and not too high Z (Z~30) the observed effective fields are quite small and are expected to weaken further for higher Z values [1]. Therefore, it is considered that the TF technique wouldn't be applicable for higher-Z ions at higher velocities.
Here we are investigating the possibility of applying the Recoils In Gas (RIG) approach for higher-Z ions at energies in the range of 100 –150 MeV/u. The basic ideas of the RIG technique will be presented and its possible applicability at RIKEN conditions would be discussed.
The Recoil In Gas technique would use a Plunger device and could therefore be integrated in a longer campaign or set of experiments aiming at lifetime measurements of exotic nuclei at RIKEN.
[1] E. Fiori et al., Phys. Rev. C85, 034334 (2012)

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