Structural issues in exotic nuclei ; how relevant are precisely measured g (2_1^+) factors

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Contemporary nuclear physics research is focused more on studying the properties of nuclei away from the stability region. The detailed spectroscopic investigations done on these exotic nuclei have revealed a number of interesting features in them [1-3]. The g factor, due to its sensitivity to the small admixtures in wave function has the potential to explain these structural features satisfactorily. So the g factor measurements in these short lived exotic nuclei, produced as radioactive beams are highly required. However, due to the special means of the production of these unstable nuclei as radioactive beams, measuring g factor in them is no easy. The few methods tested successfully so far, e.g. recoil in vacuum (RIV) and high velocity transient magnetic field (HVTF) methods, rely heavily on the availability of a suitable calibrator (stable nucleus) with precisely known (better than 10 %) g factor. The available g factor data of stable nuclei, in this respect is not very encouraging and errors as high as 50 % has been reported in some cases. So a revisit of the stable beam measurements with improved setup, detection methods and analysis techniques is highly required. Recently some precise measurements (8 %) of the g factor of 2^+ state in stable nuclei in the A ~ 60 and A ~ 130 mass region have been done with the HYPERION transient field setup [4] at the ANU, Canberra. The obtained g factors provided useful calibration of the hyperfine field for recent g (2^+) studies done in the neutron rich nuclei produced as radioactive beams at the NSCL and Oak Ridge research facilities. The results are encouraging for future g factor measurements to be done with radioactive beams.

References

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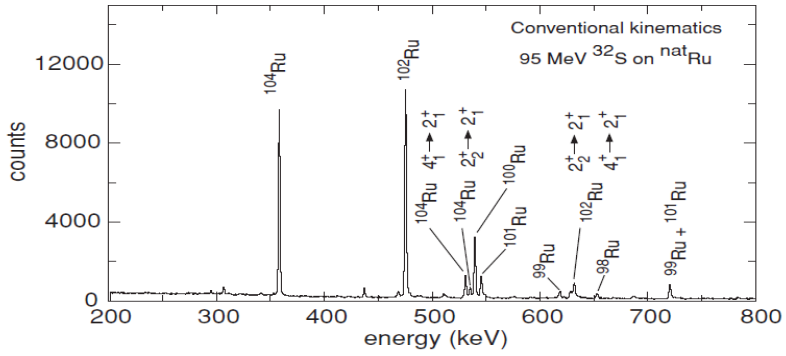

Fig.1 : Gamma ray spectrum observed at + 65^0 to the beam axis in coincidence with backscattered ^{32}S beam.

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