Emergence of nuclear collectivity through 4_1^+ g factors in $^{124-130}$Te

B.J. Coombes,[1] A.E. Stuchbery,[1] J.M. Allmond,[2] J.T.H. Dowie,[1] G. Georgiev,[3] M.S.M. Gerathy,[1] T.J. Gray,[1] T. Kibédi,[1] G.J. Lane,[1] A.J. Mitchell,[1] N.J. Spinks,[1] and B. Tee[1]

[1]*Department of Nuclear Physics, The Australian National University, ACT 0200, Australia*
[2]*Physics Division, Oak Ridge National Laboratory, Oak Ridge, TN37831, USA*
[3]*CSNSM, CNRS/IN2P3; Université Paris-Sud, UMR8609, F-91405 ORSAY-Campus, France*

The emergence of collectivity along isotopic chains gives essential information as to the degrees of freedom important in creating collectivity. Typically, the onset of collectivity has been studied through $E2$ observables which are not very sensitive to the underlying particle structure. The measurement of g factors allows the underlying single-particle structure to be sensitively probed. The 2^+, 4^+, and 6^+ states in the Te isotopes begin as $(\pi g_{7/2})^2$ states in the semi-magic ^{134}Te. As neutrons are removed below $N = 82$, the single particle nature of the low-lying states becomes more mixed and collective structures emerge. The objective of this work is to observe the origin of collective degrees of freedom by comparing experimental g factors to shell-model calculations.

Shell-model calculations of the even Te isotopes have predicted that along the isotopic chain the ratio of $g(4_1^+)/g(2_1^+)$ proceeds from $\sim$1 in the semi-magic ^{134}Te to $\sim$2 near the closed shell, before converging to the collective limit $g(2^+) \approx g(4^+) \approx 0.8Z/A$. (See e.g. the effective field theory calculations of Coello-Perez and Papenbrock for vibrational nuclei [1]). A similar pattern has been observed in $^{130-136}$Xe [2, 3]. Transient-field g-factor measurements have been performed using the ANU Hyperfine Spectrometer on separated even isotope $^{124-130}$Te targets to measure the 4_1^+ state g factors relative to the g factors of the 2_1^+ states.

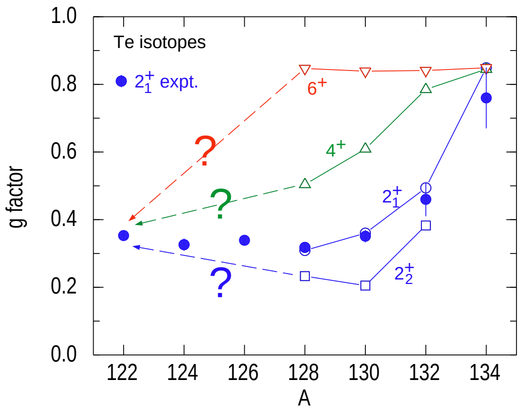

FIG. 1: Experimental g factors of the 2_1^+ states in $^{122-134}$Te. Shell-model g factors for $^{128-134}$Te are shown as hollow points.

[1] E.A. Coello-Pérez and T. Papenbrock, *Phys. Rev. C* **92**, 064309 (2015).
[2] G. Jakob *et al*, *Phys. Rev. C* **65**, 024316 (2002).
[3] E.E. Peters *et al*, *Phys. Rev. C* Accepted (2019).