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Anomalous g_I-Factor in ^{211}At

J. CHRISTIANSEN, H. INGWERSEN, W. KLINGER, G. SCHATZ, W. WITTHUHN and W. FITZ†

Physikalisches Institut der Universität Erlangen-Nürnberg, Erlangen, Germany

†II. Institut für Experimentalphysik der Universität Hamburg, Hamburg, Germany

An excellent case for studying the anomaly of the orbital g-factor g_l are the magnetic moments of the $i_{13/2}$ proton states in conjunction with the magnetic moments of the $h_{9/2}$ proton states in the lead region. This paper deals with the DPAD-measurement of the magnetic moment of the isomeric ($T_{1/2} = 70$ ns) three proton state $[(h_{9/2})^2 i_{13/2}]_{29/2^+}$ in ^{211}At. This level was populated by the reaction ^{209}Bi(α, 2n)^{211}At with the 33 MeV α-particle beam of the Hamburg cyclotron accelerator. Our first result, corrected for Knight-shift and diamagnetism, is $g_{corr} = +1.03 \pm 0.04$ (see Fig. 1).

In order to extract the g_l-factor from our measurement, a procedure is followed similar to that applied by Yamazaki *et al.* to the 8^+ and the 11^- states in ^{210}Po.[1] After decoupling the two $h_{9/2}$ protons ($g(h_{9/2}) = +0.897(16)$[2]) and including the 3^- vibrational admixtures[3] to the 13/2-state, one obtains $g^{exp}(i_{13/2}) = +1.21(9)$. This value, as well as the g-factor of the $[(h_{9/2})^3]_{21/2^-}$ state recently measured in ^{211}At,[2] is inserted into the Schmidt-equation into which effective g-factors g_l^{eff} and g_s^{eff} are introduced. Since a variation of g_s^{eff} does not effect the g_l^{eff} value very much in our case, it is assumed that $g_s^{eff}(h_{9/2}) = g_s^{eff}(i_{13/2})$, and thus one obtains two conditional equations. The solution, shown graphically in Fig. 2, is $g_l^{eff} = 1.06^{+0.07}_{-0.05}$. This value is in good agreement with the value $g_l^{eff} = 1.09 \pm 0.02$ of Yamazaki *et al.*.[1] However, for further statements a more precise measurement is desirable, which will be carried out shortly.

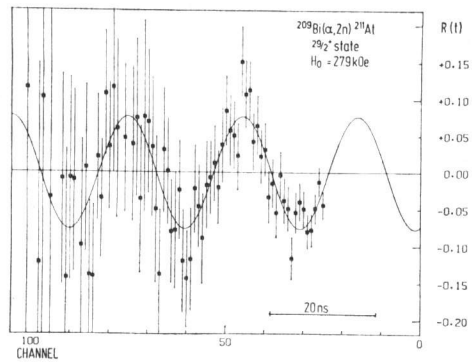

Fig. 1. Spin rotation pattern of the 70 ns isomeric state in ^{211}At.

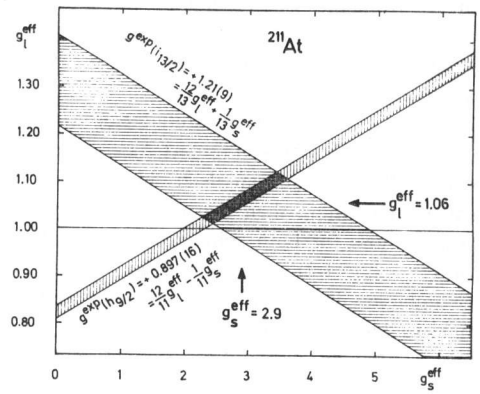

Fig. 2. Evaluation of g_l^{eff} and g_s^{eff}, using the magnetic moments of the $23/2^-$ and the $29/2^+$ states in ^{211}At.

References

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