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Is the Electron Orbital g-Factor Equal to 1 Exactly? AYODEJI AWOBODE, University of Ibadan — An important question addressed by Kusch et al in their pioneering experiments may be put as follows: If the electron g-factors are assumed corrected such that $g_L = 1 + \delta_L$ and$g_S = 2 + \delta_S$, what are the measurable magnitudes of $\delta_L$and δ_S? To answer this question, Kusch et al used the resonance Zeeman technique with which they measured the quantity$\delta_S - 2\delta_L = a_{SL}$. At that time, no independent value of δ_S or $\delta_L$was available, hence it was not possible to separately determine the two unknowns (δ_L, δ_S). It was a practical necessity therefore to assume a value for one in order to determine the other, hence it was assumed that $\delta_L = 0$. However, six decades have passed since Kusch et al skillfully measured the quantity $a_{SL} = \delta_S - 2\delta_L$, carefully eliminating bound state contributions. In sequel, experimentalists have independently of δ_L, measured δ_S with increasing precision and accuracy. A culmination of these efforts is the recent measurement of δ_S by Gabrielse et al. In view of the success recorded in the measurement of δ_S, the question posed by Kusch et al will be reopened/discussed: Is it empirically justified to set δ_L equal to zero exactly? If we combine the recent measurement of δ_S, together with that of ($\delta_S - 2\delta_L$), then it appears that$\delta_L = (-0.6 \pm 0.3) \times 10^{-4}$. Does this imply that the electron orbital g-factor is also corrected?

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