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Hyperfine and Zeeman interactions of the $a(1)[^3\Sigma^+_1]$ state of PbO

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The role of the interaction with the nearest electronic state $^3 \Sigma^+_{0^-}$ on the hyperfine structure and magnetic properties of the $a(1)[^3\Sigma^+_1]$ state of PbO is assessed. The accounting for this contribution leads to difference between g-factors of the $J=1$ Ω-doublet levels, $ \Delta g = 37\times10^{-4}$, that is in a good agreement with the experimental datum $ \Delta g = 30(8) \times10^{-4}$. The contribution of this interaction rapidly grows with J. For $J=30$ the difference of g-factors of Ω-doublet states reaches 100%; for hyperfine constants it is 18%. These differences also depend on the electric field and for $E=11$ V/cm for ^{207}PbO the difference in g-factors turn to zero. The latter is important for suppressing systematic effects in the electron electric dipole moment search experiment.

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