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Hyperfine-induced radiative decay rates of heliumlike ^{8}B and ^{11}B[1]
QIXUE WU, G.W.F. DRAKE, University of Windsor — Hyperfine mixing of LS-coupled atomic states can open new radiative decay channels for processes that would normally be strongly suppressed. For example, spin-forbidden processes may become enhanced. We study the lifetimes of the hyperfine levels of the two-electron isotopes ^{8}B ($I = 2$) and ^{11}B ($I = 3/2$) in connection with nuclear charge radius measurements by the isotope shift method [1]. We find that the effects of hyperfine structure are relatively small for both ^{8}B and ^{11}B. For the $1s2p\ ^1P$ hyperfine states, the decay rates are dominated by transitions to the $1s^2\ ^1S$ ground state with $A = 3.72 \times 10^{11}$ s^{-1}. For the $1s2p\ ^3P$ states, hyperfine structure alters the decay rates by less than 1%. The dominant decay channel is the spin-allowed transition to the $1s2s\ ^3S$ manifold of states. The decay rate for ^{8}B summed over final state hyperfine structure is in the range $A = 4.535 \times 10^7$ to 4.555×10^7 s^{-1}. The decay rate to the ground state for the $1s2p\ ^3P_1$ state is 4.169×10^6 to 4.283×10^6 s-1. The effects of hyperfine structure are smaller still for ^{11}B.
[1] W. Noertershaeuser *et al.* Phys. Rev. A **83**, 012516 (2011); Phys. Rev. Lett. **102**, 062503 (2009).

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