Hyperfine-induced Intercombination Transitions in $^3$He$^1$

QIXUE WU, GORDON W.F. DRAKE, University of Windsor — It is well known that hyperfine structure can induce transitions that are otherwise forbidden, or strongly suppressed, in heliumlike ions. We have recently found that, even in neutral helium-3, hyperfine structure can induce spin-forbidden intercombination transitions involving the higher-lying Rydberg states. In this paper we present high precision variational calculations of hyperfine-induced transitions $n \, ^1D \rightarrow n' \, ^3P$ and $n \, ^3D \rightarrow n' \, ^1P$ ($n = 3 - 10$, $n' = 2 - 9$) for $^3$He. Comparable strengths of hyperfine-induced transitions to normal E1 transitions are predicted. Conversely, normally allowed transitions can be strongly suppressed by hyperfine structure, as previously discussed and observed experimentally [1], such as $n \, ^3D_1, F = 3/2 \rightarrow 2 \, ^3P_2, F = 5/2$.


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