Branching Ratios for Hydrogenic Zeeman States from Classical Mechanics[1] MICHAEL W. HORBATSCH, ERIC A. HESSELS, MARKO HORBATSCH, York University, Toronto, Canada — In previous work we applied the classical Larmor radiation formula to calculate the lifetimes of hydrogenic Zeeman levels on the basis of classical mechanics and semi-classical quantization [1]. For the field-free case excellent agreement with quantum mechanics was obtained for total lifetimes, and good agreement for branching ratios [2]. In this work we report on (semi-)classical results for the branching ratios of Zeeman levels based on Hamilton-Jacobi perturbation theory. The branching ratios are calculated using numerical solutions of the trajectories and their Fourier analysis. While the agreement is good for partially summed branching ratios, some discrepancies with quantum results are found at the level of the full branching ratios.
[1] Phys. Rev. A 72, 033405 (2005)
[2] Phys. Rev. A 71, 020501(R) (2005).

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