Classical calculation of radiative lifetimes and branching ratios for hydrogenic Stark states.[1] MICHAEL W. HORBATSCH, ERIC A. HESSELS, MARKO HORBATSCH, York University — Recently we obtained accurate lifetime expressions for hydrogenic states on the basis of a classical Larmor radiation calculation [1]. Branching ratios (BRs) were obtained in good agreement with quantum mechanics when the Fourier components were collected to correspond to allowed final states. Accurate lifetimes were subsequently obtained for diamagnetic states [2]. Here we turn to the problem of lifetimes and BRs for Stark states of hydrogen. Classical expressions for these BRs were obtained in 1917 by H.A. Kramers. In order to go beyond that, we transform from the space of two Fourier indeces that characterize the motion in parabolic coordinates to (Dn, Dmu), which represent changes in the principal and electric quantum numbers. Using this method, we find a good correspondence between the classical predictions and quantum mechanical results even for large Dn/n. A lifetime formula and comparisons of partially summed BRs with quantum mechanical results will also be presented. [1] Phys. Rev. A 71, 020501(R) (2005); [2] Phys. Rev. A 72, 033405 (2005).

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