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Theory of Radiative-Stark Mixing[1] GOUTHAMAN BALARAMAN, RAYMOND FLANNERY, Georgia Institute of Technology — The theory of Stark mixing $n\ell - n\ell'$ transitions in atomic hydrogen $H(n\ell)$ induced by ion impact has been exactly solved analytically [1] by considering the full array of ℓ-changing transitions only within the n-shell. We now incorporate the effect of radiative transitions $n\ell - n'\ell \pm 1$. By considering the rates of radiative decay and Stark mixing, the region where radiative decay becomes competitive with Stark mixing can be identified. The Stark frequency (s^{-1}) is $\nu_S \sim v\sigma_{\ell\ell'}N^+ \sim n^3/\tilde{v}$ where N^+ is the concentration of ions and $\tilde{v}$ is ratio of ion velocity and average orbital electron velocity. The radiative frequency (s^{-1}) is $A_{n\ell} = 1.071\times10^{11}n^{-3}(\ell+1/2)^{-2}$. For typical laboratory conditions $N^+ \sim 10^8 cm^{-3}$ and $\tilde{v} \sim 1$ the two frequencies become comparable for $n \approx 17$. In this paper, we present a phenomenological approach to the theory of Stark mixing with the radiative coupling incorporated. We call this coupled process Radiative-Stark mixing to differentiate from pure Stark mixing.

References

[1] D. Vrinceanu and M. R. Flannery, Phys. Rev. A, **63**, 032701 (2001)

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