Abstract Submitted
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Dielectronic recombination and autoionization yields in weak static electric fields[1] JIRAKAN NUNKAEW, TOM GALLAGHER, University of Virginia — It should be possible to measure the contribution to dielectronic recombination (DR) of energetically unresolved high ℓ states by measuring the recombination rate as a function of electric field. As the field is raised lower ℓ states are converted to Stark states. Autoionization rates increase as ℓ is decreased, and when the field is raised to the point that an ℓ state with an autoionization rate in excess of the radiative decay rate is added to the manifold of Stark states the DR rate will exhibit an observable increase. We measure the autoionization yields of the autoionizing Ba $6p_j nk$, $j = 1/2$, $3/2$ states. The autoionization yield is complementary to DR, and the measurements indicate that the proposed approach should work well. While it is not surprising that this approach works for excited ion states which are isotropic, such as the Ba^+ $6p_{1/2}$, it is less obvious that it should work for an anisotropic ion, Ba^+ $6p_{3/2}$ where there are four quantum defects for each ℓ, and the Stark effect of the Ba $6p_{3/2}nk$ is more complex than that of the Ba $6p_{1/2}nk$. Calculations of the Stark effect reveal that, while there are four times as many $6p_{3/2}nk$ levels as $6p_{1/2}nk$ levels, many of the interactions of the $6p_{3/2}nk$ levels are negligible, and the problem is no more complicated than the $6p_{1/2}nk$ problem.

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