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The importance of multi-level Rydberg interaction in electric field tuned Förster resonances[1] JORGE KONDO, Universidade de São Paulo, DONALD BOOTH, University of Oklahoma, LUIS GONÇALVES, Universidade de São Paulo, JAMES SHAFFER, University of Oklahoma, LUIS MARCASSA, Universidade de São Paulo — Many-body physics has been investigated in ultracold Rydberg atom systems, mainly because important parameters, such as density and interaction strength, can be controlled. Several puzzling experimental observations on Förster resonances have been associated to many-body effects, usually by comparison to complex theoretical models. In this work, we investigate the dc electric field dependence of 2 Förster resonant processes in ultracold ^{85}Rb, $37D_{5/2} + 37D_{5/2} \rightarrow 35L(L = O, Q) + 39P_{3/2}$, as a function of the atomic density in an optical dipole trap. At low densities, the $39P$ yield as a function of electric field exhibits resonances. With increasing density, the linewidths increase until the peaks merge. Even under these extreme conditions, where many-body effects were expected to play a role, the $39P$ population depends quadratically on the total Rydberg atom population. In order to explain our results, we implement a theoretical model which takes into account the multi-level character of the interactions and Rydberg atom blockade process using only atom pair interactions. The comparison between the experimental data and the model is very good, suggesting that the Förster resonant processes are dominated by 2-body interactions.

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