

Abstract Submitted
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Scattering properties of strongly interacting Rydberg polaritons¹

SOONWON CHOI, Harvard University, PRZEMEK BIENIAS, University of Stuttgart, OFER FIRSTENBERG, Harvard University, MOHAMMAD MAGHREBI, National Institute of Standards and Technology, MIKHAIL LUKIN, Harvard University, ALEXEY GORSHKOV, MICHAEL GULLANS, National Institute of Standards and Technology, HANSPETER BUCHLER, University of Stuttgart — The combination of Electromagnetically Induced Transparency(EIT) and strong Rydberg-Rydberg interaction can lead to a system of interacting polaritons [1,2]. In this poster, we present a theoretical analysis of two-polariton dynamics in Rydberg EIT medium [3]. We show that the effective polariton-polariton interaction is tunable to both attraction and repulsion and investigate its scattering properties. In the regime of attraction, we identify the formation of multiple two-polariton bound states and compute their dispersions. Finally, we discuss the implications of our results to the ongoing experiments and to the effective many body theory for strongly interacting Rydberg polaritons.

[1] T. Peyronel, and et al, Nature 488, 57 (2012)

[2] O. Firstenberg, and et al, Nature 502, 71 (2013)

[3] P. Bienias, and et al, (in preparation)

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Soonwon Choi
Harvard University

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