

Abstract Submitted
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Characterization of Rydberg-polariton bound states QIYU LIANG, Massachusetts Institute of Technology, OFER FIRSTENBERG, Harvard University, THIBAUT PEYRONEL, Massachusetts Institute of Technology, MOHAMMAD MAGHREBI, University of Maryland, ALEXEY GORSHKOV, NIST / University of Maryland, MIKHAIL LUKIN, Harvard University, VLADAN VULETIC, Massachusetts Institute of Technology — Recent experiments have realized strong interactions between single photons by coupling them to Rydberg atoms in a cold gas. In the presence of an additional “coupling” field, the “probe” photons deform into Rydberg polaritons, propagate slowly in the medium with a finite effective mass, and interact strongly with each other. For an off-resonant coupling, the interaction is conservative and, in the attractive regime, supports bound states of two, three, or more polaritons. We explore theoretically and experimentally the properties of these bound states and characterize their evolution, both for finite pulses and continuous input, with two and more photons.

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