

Abstract Submitted
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Blockade induced resonant enhancement of the optical nonlinearity in a Rydberg medium¹ ANNIKA TEBBEN, CLEMENT HAINAUT, Heidelberg University, VALENTIN WALTHER, YONGCHANG ZHANG, Aarhus University, ANDRE SALZINGER, RENATO FERRACINI ALVES, NITHIWADEE THAICHAROEN, GERHARD ZUERN, Heidelberg University, THOMAS POHL, Aarhus University, MATTHIAS WEIDEMLLER, Heidelberg University, University of Science and Technology of China — We report on the observation of an enhancement of the optical nonlinearity in a Rydberg gas, which is based on an interaction-induced two-body two-photon resonance under conditions of electromagnetically induced transparency (EIT). A theoretical analysis shows that the enhancement is intimately connected to resonant Rydberg dressing. We elucidate that the resonance is only uncovered when the intermediate state dynamics, that is usually ignored and adiabatically eliminated, is explicitly considered. Experimentally, we quantitatively explore the scaling of the enhancement of the third-order susceptibility with control parameters such as the Rabi frequency of the control beam.

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Annika Tebben
Heidelberg University

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