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Quantum quench of Kondo correlations in optical absorption

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Absorption spectra of individual semiconductor quantum dots tunnel-coupled to a degenerate electron gas in the Kondo regime have recently become accessible to the experiment [1]. The absorption of a single photon leads to an abrupt change in the system Hamiltonian, which can be tailored such that it results in a quantum quench of the Kondo correlations. This is accompanied by a clear signature in the form of an Anderson orthogonality catastrophe, induced by a vanishing overlap between initial and final many-body wave functions and with power-law exponents that can be tuned by an applied magnetic field. We have modeled the experiment in terms of an Anderson impurity model undergoing an optically induced quench, and studied this *Kondo exciton* in detail using both analytical methods and the Numerical Renormalization Group (NRG). Our NRG results reproduce the measured absorption line shapes very well, showing that NRG is ideally suited for the study of Kondo excitons. In summary, the experiments demonstrate that optical measurements on single artificial atoms offer new perspectives on many-body phenomena previously studied using transport spectroscopy only.

[1] Latta et al, Nature **474** 627 (2011).
[2] Türeci et al, Phys. Rev. Lett **106**, 107402 (2011).

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