Abstract Submitted
for the MAR13 Meeting of
The American Physical Society

Rabi-Kondo correlated state in a laser-driven quantum dot[1]
MOSHE GOLDSTEIN, Yale University, BJOERN SBIERSKI, ETH Zurich, MARKUS HANL, ANDREAS WEICHSELBAUM, LMU Munich, HAKAN TURECI, Princeton University, LEONID GLAZMAN, Yale University, JAN VON DELFT, LMU Munich, ATAC IMAMOGLU, ETH Zurich — Spin exchange between a single-electron charged quantum dot and itinerant electrons leads to the emergence of Kondo screening. When the quantum dot is driven resonantly by a weak laser light, the resulting emission spectrum serves as a direct probe of these correlations. In the opposite limit of vanishing exchange interaction and strong laser drive, the quantum dot exhibits coherent Rabi oscillations between the single-spin and optically excited states at the "bare" frequency Ω. Here we show that the interplay between strong exchange and non-perturbative laser coupling leads to the formation of a new non-equilibrium quantum-correlated state, featuring a second screening cloud. We elucidate the signatures of that state in the spectrum of luminescence. The spectrum consists of a delta-function peak at the laser light frequency (the peak weight scales as $\Omega^{2/3}$) and a broad peak red-shifted by the renormalized Rabi frequency $\Omega^* \propto \Omega^{4/3}$. The shape of the broad peak carries detailed information about the spin screening cloud.

[1]The work at Yale University is supported by the Simons Foundation and by NSF DMR Grant No. 1206612

Moshe Goldstein
Yale University

Date submitted: 08 Nov 2012 Electronic form version 1.4