

Abstract Submitted
for the MAR14 Meeting of
The American Physical Society

0D- to 2D-transition of electronic states in SK quantum dots

CYPRIAN CZARNOCKI, MARK KERFOOT, University of California, Merced, ALLAN BRACKER, DANIEL GAMMON, Naval Research Laboratory, MICHAEL SCHEIBNER, University of California, Merced — Level anti-crossing spectroscopy (LACS) has demonstrated the capabilities of mapping the discrete electronic states of a nearby quantum dot by sequentially tunnel coupling another dot's ground state to the energy level ladder of the quantum dot of interest [1]. Here we expand this method and identify the dot to wetting layer transition, i.e., the transition from zero- to two-dimensional states. We find a wealth of states at elevated energies. The identification of these states takes into account the charge and spin configuration of the involved optical transitions. Thereby we identify cross-talk channels between quantum dot molecule states. We anticipate our findings to provide insights for the lateral coupling of neighboring dots and dot molecules through extended 2-D like states.

[1] M. Scheibner, M. Yakes, A. S. Bracker, I. V. Ponomarev, M. F. Doty, C. S. Hellberg, L. J. Whitman, T. L. Reinecke, D. Gammon, *Optically mapping the electronic structure of coupled quantum dots*, Nature Phys. Lett. **4**, 291-295 (2008).

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Date submitted: 15 Nov 2013

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