Abstract Submitted
for the MAR13 Meeting of
The American Physical Society

Coherent electron transfer between distant quantum dots in a linear array FLORIS BRAAKMAN, PIERRE BARTHELEMY, LIEVEN VANDERSYPEN, TU Delft, KAVLI INSTITUTE OFNANOSCIENCE TEAM — Tunnel coupled quantum dots form the basis for electronic charge and spin qubits in semiconductors. The tunnel coupling gives rise to quantum coherent phenomena such as exchange oscillations of neighboring spins. However, tunnel coupling strength between non-neighbouring sites is negligible and it is therefore desirable to develop a form of long range coupling. In a linear array of three quantum dots, we demonstrate an effective tunnel coupling between the outer dots through virtual occupation of discrete levels in the center dot. The coupling strength depends strongly on the detuning between center and outer dot levels. The observation of Landau-Zener-Stueckelberg oscillations demonstrates the coherent nature of the coupling. In principle the effective long-range tunnel coupling should also allow coherent exchange of remote spins.

Floris Braakman
TU Delft

Date submitted: 09 Nov 2012 Electronic form version 1.4