Abstract Submitted
for the MAR15 Meeting of
The American Physical Society

Fast Long-Distance Control of Spin Qubits by Photon Assisted Cotunneling PETER STANO, RIKEN Center for Emergent Matter Science, Wako, Saitama, Japan, JELENA KLINOVAJA, FLORIS BRAAKMAN, Department of Physics, Klingelbergstrasse 82, University of Basel, Switzerland, LIEVEN VANDERSYPEN, Kavli Institute of Nanoscience, TU Delft, 2600 GA Delft, The Netherlands, DANIEL LOSS, Department of Physics, Klingelbergstrasse 82, University of Basel, Switzerland — We investigate theoretically the long-distance coupling and spin exchange in an array of quantum dot spin qubits in the presence of microwaves. We find that photon assisted cotunneling is boosted at resonances between photon and energies of virtually occupied excited states and show how to make it spin selective. We identify configurations that enable fast switching and spin echo sequences for efficient and non-local manipulation of spin qubits. We devise configurations in which the near-resonantly boosted cotunneling provides non-local coupling which, up to certain limit, does not diminish with distance between the manipulated dots before it decays weakly with inverse distance.

Peter Stano
CEMS, RIKEN, Saitama

Date submitted: 12 Nov 2014 Electronic form version 1.4