

Abstract Submitted
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Tailoring Effective Exchange Interactions via Domain Walls in Coupled Heisenberg Rings¹ VANITA SRINIVASA, JEREMY LEVY, Department of Physics and Astronomy, University of Pittsburgh, Pittsburgh, PA 15260 — The nature of the exchange coupling variation in an antiferromagnetic spin-1/2 system can be used to tailor its ground-state properties. In particular, dimerized Heisenberg rings containing domain walls have localized states which can serve as “flying spin qubits” when the domain walls are moved (PRB **76**, 094411 (2007)). We show theoretically that, when two of these rings are coupled, the movement of the domain walls leads to modulation of the effective exchange interaction between the qubits. Appropriately chosen configurations of domain walls can give rise to ferromagnetic effective exchange. We describe how these spin rings may be used as basic building blocks to construct quantum spin systems whose properties are tunable by virtue of the exchange variation within the rings.

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