Abstract Submitted
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Electronic and transport properties of a lateral triple quantum dot molecule in a magnetic field F. DELGADO[1], Y.-P. SHIM, M. KORKUSINSKI, P. HAWRYLAK, Quantum Theory Group, Institute for Microstructural Sciences, NRC, Ottawa, ON, Canada K1A 0R6 — We present a theory of spin, electronic and transport properties of a few-electron lateral triangular triple quantum dot molecule in a magnetic field. Our theory is based on a Hubbard model and the Linear Combination of Harmonic Orbitals combined with Configuration Interaction method to arbitrary magnetic fields. The one-particle spectra obtained as a function of the magnetic field exhibit Aharonov-Bohm oscillations. As a result, by changing the magnetic field it is possible to engineer the degeneracies of single-particle levels, and thus control the total spin of the many-electron system. For the triple dot with two and four electrons we find oscillations of total spin due to the singlet-triplet transitions occurring periodically in the magnetic field. In the three-electron system we find a transition from a magnetically frustrated to the spin-polarized state. The impact of these phase transitions on the addition spectrum are analyzed and the qualitative behaviour of the current through the quantum molecule under spin blockade conditions is studied as a function of the applied magnetic field

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