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Spin Wigner molecules in quantum dots[1] IGOR ZUTIC, RAFAL OSZWALDOWSKI, University at Buffalo, PETER STANO, Slovak Academy of Sciences and University of Basel, A. G. PETUKHOV, South Dakota School of Mines and Technology — The interplay of confinement and Coulomb interactions in quantum dots can lead to strongly correlated phases differing qualitatively from the Fermi liquid behavior. While in three dimensions the correlation-induced Wigner crystal is elusive and expected only in the limit of an extremely low carrier density, its nanoscale analog, the Wigner molecule, has been observed in quantum dots at much higher densities [1]. We explore how the presence of magnetic impurities in quantum dots can provide additional opportunities to study correlation effects and the resulting ordering in carrier and impurity spins [2]. By employing exact diagonalization we reveal that seemingly simple two-carrier quantum dots lead to a rich phase diagram [2,3]. We propose experiments to verify our predictions; in particular, we discuss interband optical transitions as a function of temperature and magnetic field. [1] C. Ellenberger et al., Phys. Rev. Lett. **96**, 126806 (2006); A. Singha et al., Phys. Rev. Lett. **104**, 246802 (2010). [2] R. Oszwaldowski, P. Stano, A. G. Petukhov, and I. Zutic, Phys. Rev. B (Rapid Comm.), in press, arXiv:1210.6422. [3] R. Oszwaldowski, I. Zutic, and A. G. Petukhov, Phys. Rev. Lett. **106**, 177201 (2011).

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