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Spectral and transport properties of ballistic quantum wire exposed to two magnetic spikes BERND SCHUELER, MIHAI CERCHEZ, HENGYI XU, THOMAS HEINZEL, HHU Duesseldorf — Quantum Dots (QD) in two-dimensional electron gases are typically defined by nanopatterned gate electrodes.[1] While magnetically confined QDs have been proposed theoretically to show some specific phenomena,[2] their experimental implementation is still at an early stage.[3] We have designed a ferromagnet/semiconductor hybrid structure device which allows us to form a QD by combining electrostatic potentials with localized magnetic fields in the form of two magnetic spikes at sub-micron distances. While numerical simulations of this system predict Coulomb blockade in the closed regime and Fano type resonances in the open system,[4] we observe experimentally transmission resonances in the open system which can be interpreted as signatures of zero-dimensional states weakly bound by the magnetic field profile.

[1]see, e.g., L. P. Kouwenhoven et al., in Mesoscopic Electron Transport, Series E: Applied Sciences (Eds. L. L. Sohn, L. P. Kouwenhoven and G. Schon (Kluwer, 1997).
[2]S.J. Lee et al., Phys. Rep. **394**, 1 (2004)
[3]A. Tarasov et al., Phys. Rev. Lett. **104**, 186801 (2010)
[4]H. Xu et al. Phys. Rev. B **84**, 035319 (2011)

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