Abstract Submitted
for the MAR10 Meeting of
The American Physical Society

Confinement and dot formation in quantum wires by inhomogeneous magnetic fields THOMAS HEINZEL, MIHAI CERCHEZ, HENGYI XU, ALEXEY TARASOV, Heinrich-Heine University Dusseldorf, STEFAN HUGGER, Fraunhofer Institut f Festkörperforschung, IGOR ZOZOULENKO, Univ. of Linkoping, DIRK REUTER, ANDREAS WIECK, Ruhr University Bochum — Ballistic quantum wires are exposed to longitudinal profiles of perpendicular magnetic fields composed of a spike (a *magnetic barrier*) and a homogeneous part. An asymmetric magnetoconductance peak as a function of the homogeneous magnetic field is found, comprising quantized conductance steps in the interval where the homogeneous magnetic field and the magnetic barrier have identical polarities, and a characteristic shoulder with several resonances in the interval of opposite polarities. The observations are interpreted in terms of inhomogeneous diamagnetic shifts of the quantum wire modes leading to magnetic confinement. Depending on the offset magnetic field, single or double quantum dots can e formed. A numerical simulation of the conductance based on recursive Green's functions reproduces all aspects of the data qualitatively.

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Date submitted: 28 Oct 2009 Electronic form version 1.4