Abstract Submitted for the MAR14 Meeting of The American Physical Society

Exceptional ballistic transport in epitaxial graphene nanoribbons CHRISTOPH TEGENKAMP, JENS BARINGHAUS, FREDERIK EDLER, Institut für Festkörperphyik, Leibniz Universität Hannover, CLAIRE BERGER, WALT A. DE HEER, School of Physics, Georgia Institute of Technology, Atlanta, USA — The patterning of graphene into graphene nanoribbons is an essential task for the development of graphene based devices. For such ribbons with a well-ordered edge geometry the presence of one-dimensional edge states has been predicted. We use a selective graphitization process on SiC-mesa structures to produce graphene nanoribbons with a width of 40 nm. The local electronic properties of the ribbons are investigated by means of a 4-tip STM. In combination with a SEM, the precise positioning of all four tips on the nanometer range is possible to perform local transport measurements. Furthermore, local tunneling spectroscopy reveals characteristic features of ferromagnetic zig-zag graphene nanoribbons. Transport experiments carried out on the very same ribbon show a conductance of e^2/h for a wide temperature range from 30 K up to room temperature and probe spacings between 1 μm and 10 μm . Description within the Landauer formalism is possible assuming ballistic transport dominated by a single channel. Transportin the second zeroth subband is only detectable for probe spacings smaller than 1 μm due to the short localization length of carriers in this subband manifesting in the increase of the conductance to $2e^2/h$ at probe spacings below 200 nm.

> Christoph Tegenkamp Institut für Festkörperphyik, Leibniz Universität Hannover

Date submitted: 15 Nov 2013 Electronic form version 1.4