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Imaging fractional incompressible stripes in integer quantum Hall systems

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Transport experiments provide conflicting evidence on the possible existence of fractional order within integer quantum Hall systems. In fact, integer edge states sometimes behave as monolithic objects with no inner structure [1,2], while other experiments clearly highlight the role of fractional substructures [3,4]. Recently developed low–temperature scanning probe techniques offer today an opportunity for a deeper–than–ever investigation of spatial features of such edge systems. Here we use scanning gate microscopy (SGM) and demonstrate that fractional features were unambiguously observed in *every* integer quantum Hall constriction studied. The configuration of our samples is similar to that described in [5]. Experiments were performed at bulk filling factor nu=1. We brought two counter–propagating integer–edge channels into proximity by means of a quantum point contact (QPC) and used the biased SGM tip to tune backscattering. Plateaus are observed in source–drain differential conductance maps whenever the tip induces an incompressible phase at the QPC center. We present SGM maps which directly reveal the width of the most relevant fractional incompressible stripes, corresponding to filling factors 1/3 and 2/5, together with their particle–hole conjugates 2/3 and 3/5. Our results compare well with predictions of the edge–reconstruction theory [6] and may open up exciting developments. For instance, the ability to partition an integer edge and partially transmit one of its fractional components may be the key for the implementation of fractional quasi-particle Mach-Zehnder interferometers.

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Interrelation between charge transport and structural properties of printed metal oxide semiconductors

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The vision of printing transparent electronic circuits on flexible substrates which outperform a-Si electronics has been driving research on printed metal oxide electronics considerably. We studied systematically the interrelation between the charge carrier mobility μ in printed metal oxide semiconductor field effect transistors (MOSFETs) from In/Zn oximate precursor solutions and the growth of semiconducting Indium-Zinc-Oxide (IZO) thin films. We observed a strong dependence of the carrier mobility μ on the concentration of the precursor solution and the number of deposited layers whereas the total thickness of the IZO film is similar. Further investigations of the film growth with scanning electron microscopy (SEM), atomic force microscopy (AFM), x-ray photoelectron spectroscopy (XPS) and secondary ion mass spectroscopy (SIMS) indicate that the increase in mobility μ is directly related to small but significant changes in morphology of the amorphous IZO thin film.