Abstract Submitted for the MAR09 Meeting of The American Physical Society

Universal dephasing in chiral one-dimensional electron systems FLORIAN MARQUARDT, CLEMENS NEUENHAHN, Arnold Sommerfeld Center for Theoretical Physics, Center for NanoScience, and Department of Physics, Ludwig-Maximilians University Munich — The Green's function of a chiral interacting one-dimensional fermion system obeys a power-law decay at high energies, at zero temperature. Surprisingly, we find that the exponent is universal, i.e. independent of the interaction strength, for (almost) arbitrarily shaped interaction potentials. This has direct implications for the interference contrast in ballistic interferometers, e.g. the Mach-Zehnder interferometer composed of edge channels in the integer quantum Hall effect. Our result is obtained using a straightforward and physically transparent "semiclassical" approach to dephasing by electron- electron interactions. This approach is shown to coincide with the exact bosonization results in the high-energy regime of interest.

> Florian Marquardt Arnold Sommerfeld Center for Theoretical Physics, Center for NanoScience, and Department of Physics, Ludwig-Maximilians University Munich

Date submitted: 01 Dec 2008

Electronic form version 1.4