Nonlinear Luttinger Liquid: Exact solution for the Green function from the fourth Painleve transcendent TOM PRICE, Utrecht University, DMITRY KOVRIZHIN, University of Oxford, AUSTEN LAMACRAFT, University of Cambridge — The linear Luttinger liquid describes many low energy properties of interacting one dimensional quantum systems. A classic example is the quantum Hall edge, where low energy excitations are chiral edge waves, and the electron spectral function is a power law in momentum space. However, the approximation of linear dispersion introduces an exact degeneracy between all states of fixed momentum, so in frequency space the spectral function is a delta peak. To correctly describe the spectral function it is necessary to include electron dispersion. I'll show how the electron Green function including dispersion may be expressed in terms of the fourth Painleve equation, analogous to the celebrated Tracy–Widom distribution that appears in random matrix theory and the Kardar–Parisi–Zhang universality class of stochastic interface growth.

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