Coulomb correlations in ultrathin wires MICHAEL FOGLER, UCSD
— We compute the ground-state energy and the density-density correlation function
of electron liquid in a thin one- dimensional wire. The calculation is based on an
approximate mapping of the problem with a realistic Coulomb interaction law onto
exactly solvable models of mathematical physics. This approach becomes asymp-
totically exact in the limit of small wire radius but remains numerically accurate
even for modestly thin wires. Possible experimental realizations of the model include
semiconducting carbon nanotubes on high-kappa dielectric substrates and quantum
wires near metallic gates.

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