An Exact Solution for the Half-filled Lowest Landau Level

EMIL BERGĦOLTZ, ANDERS KARLHEDE, Stockholm University — We present an exact solution for the interacting electron gas in the half-filled lowest Landau level on a thin torus. The low energy sector consists of non-interacting, one-dimensional, neutral fermions (dipoles). The ground state, which is homogeneous, is the Fermi sea obtained by filling the negative energy states and the excited states are the gapless neutral excitations out of this one-dimensional sea. We identify this ground state as a version of the Rezayi-Read state, and find that it develops continuously, as the circumference grows, into the Rezayi-Read state that is believed to describe the observed metallic phase in the two-dimensional system. This suggests a Luttinger liquid description of the half-filled Landau level.