A Glance at Electronic Order in Two Dimensions

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Electrons in two physical dimensions order in a rich set of patterns, also called electronic ground states. The study of these ground states has enriched the branch of physics called condensed matter physics with numerous novel ideas and concepts. Perhaps the simplest, most widely known example of a ground state is the Fermi liquid. However, under extreme conditions, electrons in this system may also organize themselves in unexpected ways. In this seminar we will introduce and discuss some basic properties of exotic ground states of the two-dimensional electron gas such as the integer and fractional quantum Hall states, the Wigner solid, and electronic bubble and stripe phases.

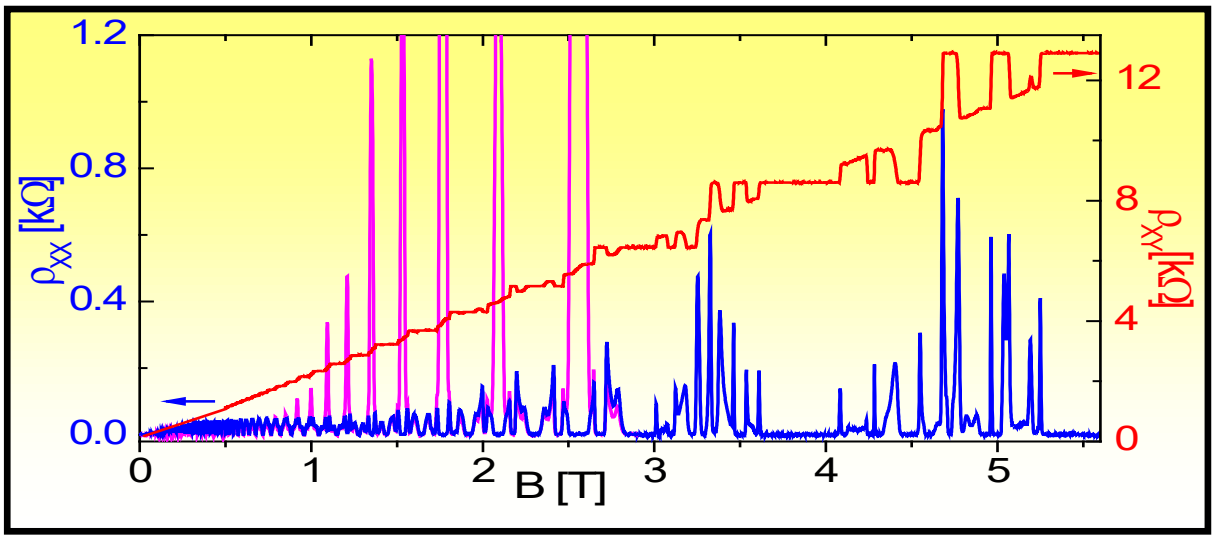

Figure: Resistance measurements performed at temperatures below 1 Kelvin reveal a rich set of ground states in the two dimensional electron gas. Each flat part of the resistance between abruptly changing segments marks a distinct ground state.