Sommerfeld Theory Colloquium

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Fractional Quantum Numbers

Quantum theory has shown us that dynamical entities, which take continuous values in classical theory, may posses only discrete "quantized" values -- for example angular momentum, energy, etc. Here I describe a further quantum phenomenon affecting quantities that in a classical physics description take on discrete values -- for example particle number. In the quantum theory this integrality can be lost, becoming replaced by fractional or even continuous values. Physical realization of this "quantum weirdness" was first found in one-dimensional systems (polyacetylene) and then on the plane, in the quantum Hall effect. However, there is a significant difference between the mechanisms responsible for these two instances of frac-tionalization. The former arises in a T-invariant theory, while the latter requires T-violation, owing to the presence of a back-ground magnetic field. Recently there has come the realization that a "Hall" - type effect can arise even with conserved T. Stimulated by this, there T-conserving planar models were found in which charge is fractionalized. These are based on theoretical extensions of graphene-like planar systems.

Wednesday, 17th June 09, 10:30 h, Room 348 / 349, Theresienstr. 37 / III

Prof. I. Sachs