



Sonderforschungsbereich 631
Festkörperbasierte Quanteninformationsverarbeitung



Condensed Matter Theory Seminar

Thursday, June 28, 4 pm
Room 450, Theresienstr. 37, 4th floor

Speaker: **Dr. Chris Mudry**
Paul Scherrer Institut

Titel: *Electron fractionalization in two-dimensional graphene-like structures*

Abstract:

Electron fractionalization is intimately related to topology. In one-dimensional systems, fractionally charged states exist at domain walls between degenerate vacua. In two-dimensional systems, fractionalization exists in quantum Hall fluids, where time-reversal symmetry is broken by a large external magnetic field. Recently, there has been a tremendous effort in the search for examples of fractionalization in two-dimensional systems with time-reversal symmetry. In this paper, we show that fractionally charged topological excitations exist on graphene-like structures, where quasiparticles are described by two flavors of Dirac fermions and time-reversal symmetry is respected. The topological zero-modes are mathematically similar to fractional vortices in p-wave superconductors. They correspond to a twist in the phase in the mass of the Dirac fermions, akin to cosmic strings in particle physics.