Abstract Submitted
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An effective theory of two-dimensional fractional topological insulators[1] PREDRAG NIKOLIC, George Mason University — A generic spin-orbit coupling in 2D electron systems can be represented by an SU(2) gauge field with a non-trivial SU(2) flux. This makes it possible to stabilize novel non-Abelian incompressible quantum liquids by appropriate interactions (perhaps useful in quantum computing). We will discuss a generalization of the Chern-Simons Lagrangian to an arbitrary SU(N) symmetry group that describes such liquids. This effective field theory contains a Landau-Ginzburg part, which identifies the low energy fluctuations near any putative second-order quantum phase transition between conventional phases. Whenever an incompressible quantum liquid intervenes in such a phase transition, the fractional statistics of its quasiparticles is governed by the topological term of this theory and determined by the low energy dynamics. Commuting external gauge fields reduce the topological term to a Chern-Simons or BF form appropriate for fractional quantum (spin) Hall states, but the generic non-commuting gauge fields are expected to yield new classifiable topological orders without a quantum Hall analogue. We will discuss the possible non-Abelian fractional states in topological insulator quantum wells shaped by the Rashba spin-orbit coupling.

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Predrag Nikolic
George Mason University

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