MAR12-2011-005432

Abstract for an Invited Paper
for the MAR12 Meeting of
the American Physical Society

Fractional Topological Insulators[1]

CLAUDIO CHAMON, Boston University

The prediction and experimental discovery of topological band insulators and topological superconductors are recent examples of how topology can characterize phases of matter. In these examples, electronic interactions do not play a fundamental role. In this talk I shall discuss cases where interactions lead to new phases of matter of topological character. Specifically, I shall discuss fractional topological states in lattice models which occur when interacting electrons propagate on flattened Bloch bands with non-zero Chern number. Topologically ordered many-particle states can emerge when these bands are partially filled, including a possible realization of the fractional quantum Hall effect without external magnetic fields. I shall also ponder on the possible practical applications, beyond metrology, that the quantized charge Hall effect might have if it could be realized at high temperatures and without external magnetic fields in strongly correlated materials.

[1]Work supported by DOE Grant DEFG02-06ER46316