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Théorie conforme des champs et systèmes quantiques à plusieurs corps
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Conformal field theory and quantum many-body physics
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Karyn Le Hur
(École Polytechnique - CNRS)

Fractional Topological Numbers and Correlated Entangled Matter

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Interactions within topological systems have produced novel phases of matter through the fractional quantum Hall effect and topological Mott phases.

Here, we introduce interaction effects between two Bloch spheres each describing a topological lattice model such as a Haldane model or a topological p-wave superconductor. We identify the possibility of fractional topological numbers through the introduction of adjustable Semenoff masses realizing a Z2 sphere-inversion symmetry. We discuss applications and engineering of this classification for topological insulators and topological superconducting wires. We also show that a fractional topological number can give rise to a topological bilayer semimetal with a quantized π Berry phase at one Dirac point and a nodal ring semimetal at the other Dirac point. The spheres find practical and real applications in circuit quantum electrodynamics and atomic physics through a quantum dynamo effect when rolling from north to south pole.