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Mapping topological order in coordinate space RAFFAELE RESTA, RAFFAELLO BIANCO, Phys. Dept., Univ. of Trieste — Topological insulators are distinguished from normal ones by the manner in which the electronic ground state is knotted in k-space. But topological order also reflects a peculiar organization of the electrons even when the concept of k-space does not make any sense, for e.g. inhomogeneous systems and finite systems within open boundary conditions. Here we only address Chern vs. normal insulators, within an independent-electron scheme in 2d. We introduce a "topological marker" in the form of a local Chern number, which may vary in different regions of the same sample. Since our marker samples the electron distribution locally, the boundary conditions (either periodic or open) are irrelevant. Actual simulations based on the model Haldane Hamiltonian, all of them adopting open boundary conditions, demonstrate the power of our approach. We provide perspicuous plots of our topological marker for crystalline and disordered samples, either normal or Chern insulators. We also monitor the Chern number switching in two cases: varying the Hamiltonian parameters in homogeneous samples, and addressing heterojunctions where two homogeneous regions (having different order) are joined. In all test cases our marker provides an unmistakable signature of the actual topological order.

Raffaele Resta
Phys. Dept., Univ. of Trieste

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