Topological Phenomena in Periodically Driven Systems: The Role of Disorder and Interactions

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Periodically driven quantum systems, such as semiconductors subject to light and cold atoms in optical lattices, provide a novel and versatile platform for realizing topological phenomena. Some of these are analogs of topological insulators and superconductors, attainable also in static systems; others are unique to the periodically driven case. I will describe how periodic driving, disorder, and interactions can conspire to give rise to new robust steady states, with no analogues in static systems. In disordered two-dimensional driven systems, a phase with chiral edge states and fully localized bulk states is possible; this phase can realize a non-adiabatic quantized charge pump. In interacting one dimensional driven systems, current carrying states with excessively long life times can arise.