# Harmonic generation, topology, and interaction

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It has been demonstrated that the topology of a solid target has an impact on the harmonic spectra emitted when it interacts with an intense laser pulse. At least two effects contribute to this phenomenon. Firstly, qualitative changes in the Berry curvature occur during a topological phase transition, influencing the dynamics of laser-driven electrons and consequently, the generation of harmonics. This effect is observed in the bulk. Secondly, if the solid is in the topological phase, the laser inherently detects the presence of topologically protected edge states, while in the trivial phase, only ordinary edges are probed. As a result, topological edge states may generate "their own" harmonics, exhibiting distinct features compared to those originating from the bulk. I will illustrate this concept in my presentation by utilizing the paradigmatic Su-Schrieffer-Heeger (SSH) and Haldane models.

In the second part of my talk, I will discuss the role of electron-electron interaction. Specifically, I will focus on whether the topological effects observed in effectively non-interacting electrons persist in the presence of electron-electron interaction. Are the topologically protected edge states resilient when subjected to increasing electron-electron interaction? How do the harmonic spectra change as electron-electron interaction is increased? To address these questions, I will present results obtained for a short, half-filled SSH-Hubbard chain that is simple enough to be solved numerically but already shows interesting physics.