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Novel ways of creating and detecting topological order with cold atoms and ions[1]

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In my talk I will focus on novel physics and novel quantum phases that are expected in lattice systems of ultra-cold atoms or ions in synthetic gauge fields, generated via lattice modulations and shaking. I will discuss fractal energy spectra and topological phases in long-range spin chains realized with trapped ions or atoms in nanofibers, and synthetic gauge fields in synthetic dimensions. I will spend large part of the talk discussing the ways to detect topological effects and order, via tomography of band insulators from quench dynamics, or via direct imaging of topological edge states.

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