Unconventional fractional topological states

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In the talk, I will introduce two unconventional issues for the fractional topological states. The first is the realization of a fractional topological Stark insulator without interaction, and the second is about the transition from an integer topological state to a fractional topological phase. The fractional topological phase usually relates to gap-protected ground state degeneracy, which may necessitate strong interaction. We show an interesting example that the Stark localization on top of topological flat bands can drive the system into a fractional topological state, which emerges when a real-space energy gap due to Stark localization dominates over the original band topological gap. The fractional topology can be observed with fractional charge pumping. For the second example, we consider a 1+1D topological lattice with modulated long-range interaction, and predict a transition from an integer topological state to fractional topological phase when a quasi-CDW order emerges. The both examples introduce a novel issue regarding the transition from integer to fractional topological states, which in the second case is driven by a nontrivial transition in the excited many-body state. The experimental proposals will also be discussed.