Jan 18, 2021 10:00 AM
QED & Materials seminar
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Abstract

"Anomalous and normal dislocation modes in Floquet topological insulators"

Electronic band structure featuring nontrivial bulk topological invariant manifest through robust gapless modes at the boundaries, e.g., edges and surfaces. As such this bulk-boundary correspondence is also operative in driven quantum materials. For example, a suitable periodic drive can convert a trivial state into a Floquet topological one, accommodating non-dissipative dynamic gap-less modes at the interfaces with vacuum. Here we theoretically demonstrate that dislocations, ubiquitous lattice defects in crystals, can probe Floquet topological and an unconventional π-trivial insulators in the bulk of a driven quantum system by supporting normal and anomalous modes atits core. Respectively they reside at the Floquet zone center and boundary. We exemplify these out-comes specifically for two-dimensional Floquet Chern insulator and $p_x+ ip_y$ superconductor, where these localized modes are respectively constituted by charged and neutral Majorana fermions. Our findings should be instrumental in probing Floquet topological phases in the state-of-the-art experiments in driven quantum crystals and metamaterials through bulk topological lattice defects.