Topological protection of squeezed light in a topological photonic lattice [1]

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What is the role of the lattice's topology in the propagation of quantum states of light in a photonic lattice? Here we address the propagation of squeezed light in a topological one-dimensional waveguide array, exploring the evolution of photon statistics, squeezing and entanglement. We find that propagating squeezed light in a topologically protected state robustly preserves the phase of the squeezed quadrature, for both single- and two-mode squeezed states. In the latter case, the lattice's topology allows to control the entangled variables of the state. As a proof of concept, we implement a quantum teleportation protocol to compare the resulting fidelity for the topological lattice with that for a trivial lattice, showing a clear *topological advantage*. This topological protection might open a path for harnessing quantum information through light propagation in photonic lattices.

References

[1] J. Medina Dueñas, G, O'Ryan Pérez, C. Hermann-Avigliano, L. E. F. Foa Torres, Quantum ***5*** (2021) 526