# Helicity, topology and Kelvin waves in reconnecting quantum knots

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Helicity is a topological invariant that measures the linkage and knottedness of lines, tubes and ribbons. As such, it has found myriads of applications in astrophysics and solar physics, in fluid dynamics, in atmospheric sciences, and in biology. In quantum flows, where topology-changing reconnection events are a staple, helicity appears as a key quantity to study. However, the usual definition of helicity is not well posed in quantum vortices, and its computation based on counting links and crossings of vortex lines can be downright impossible to apply in complex and turbulent scenarios. We present a new definition of helicity which overcomes these problems. With it, we show that only certain reconnection events conserve helicity. In other cases helicity can change abruptly during reconnection. Furthermore, we show that these events can also excite Kelvin waves, which slowly deplete helicity as they interact nonlinearly, thus linking the theory of vortex knots with observations of quantum turbulence.