



# Understanding and manipulating complex quantum systems through elementary excitations

Complex quantum systems exhibit a wealth of fascinating phenomena that often manifest themselves in the presence of quasiparticles with intriguing properties. On the one hand, quasiparticles may serve as a probe to further our understanding of correlated systems and exotic phases of matter, on the other hand, unique quasiparticle properties may enable novel applications.

As a concrete example, I will discuss a generic novel transport phenomenon of a mobile quantum impurity immersed in a bath, which is relevant to the dynamics of cold atomic gases as well as exciton polaritons in semiconductor-microcavity systems. As a second example, I will present a novel platform for Majorana states in topological superconductors with promising first experimental results, and propose using Majoranas to simulate strongly correlated systems.

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