

سمینار هفتگی گروه اطلاعات کوانتومی
سه‌شنبه ۱۳۹۴/۱۲/۲۵، ساعت ۱۵:۰۰، اتاق شورای دانشکده‌ی فیزیک

Topological robustness in photonic systems

Mohammad Hafezi

University of Maryland, College Park (UMD)

Abstract

Phenomena associated with the topological properties of physical systems can be naturally robust against perturbations. The best known examples are quantum Hall effects in electronic system, where insensitivity to local properties manifests itself as conductance through edge states that is insensitive to defects and disorder. In this talk, I demonstrate how similar physics can be observed for photons; specifically, how various quantum Hall Hamiltonians can be simulated in an optical platform. I report on the first observation of topological photonic edge states using silicon-on-insulator technology, and the measurement of the corresponding topological invariants. Furthermore, the addition of optical nonlinearity to this system provides a platform to implement fractional quantum Hall states of photons and anyonic states that have not yet been observed in any physical system. More generally, the application of these ideas could lead to the development of optical devices with built-in protection for classical and quantum information processing.