Abstract Submitted
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Switching electromagnetically induced transparency via chiral optical states at exceptional points[1] CHANGQING WANG, LAN YANG, Washington University in St. Louis — Electromagnetically induced transparency (EIT) is a quantum interference effect that renders an opaque medium transparent with the presence of strong coherent light. Associated with EIT is a strong reduction of the group velocity of light in the medium, which enables extensive applications in slow-light generation, optical storage and quantum memory. Recently, unconventional physical properties of open systems have been widely studied especially around the non-Hermitian singularities, i.e., exceptional points (EPs), where the eigenvalues and the eigenstates of the non-Hermitian systems become degenerate. Here we present a novel way of controlling the EIT process in optical resonator systems by exploiting chiral optical states at the EPs. Optical interference can be switched on and off by tuning one resonator to two different types of EPs with opposite chirality, which enables the switch between EIT and absorption. This novel routes for EIT control leveraging non-Hermitian degeneracies will shed new light on the engineering of slow light and optical memory. The state control approach which is compatible with quantum gate operation may build up a connection between quantum information processing and quantum memory.

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Changqing Wang
Washington University in St. Louis

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