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Topological photonic orbital angular momentum switch XI-WANG LUO, CHUANWEI ZHANG, The University of Texas at Dallas, GUANG-CAN GUO, ZHENG-WEI ZHOU, University of Science and Technology of China — The large number of available orbital angular momentum (OAM) states of photons provides a unique resource for many important applications in quantum information and optical communications. However, conventional OAM switching devices usually rely on precise parameter control and are limited by slow switching rate and low efficiency. Here we propose a robust, fast and efficient photonic OAM switch device based on a topological process, where photons are adiabatically pumped to a target OAM state on demand. Such topological OAM pumping can be realized through manipulating photons in a few degenerate main cavities and involves only a limited number of optical elements. A large change of OAM at $\sim 10^q$ can be realized with only q degenerate main cavities and at most $5q$ pumping cycles. The topological photonic OAM switch may become a powerful device for broad applications in many different fields.

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