

The Role of Topological Beam Splitters



Overview

Topological beam splitting (BS) based on edge states with unique properties such as unidirectionality, robustness to impurities or defects, and anti-scattering shows broad prospects in building high-performance photonic chips. The tunable splitting ratio is extremely important for the practical. The usual Su-Schrieffer-Heeger model with an even number of lattice sites possesses two degenerate zero-energy modes. The degeneracy of the zero-energy modes leads to the mixing between the topological left- and right-edge states, which makes it difficult to implement the state transfer via. GUANGZHOU, China, May 29, 2023 — Recent research has investigated novel approaches to beam-splitting in the context of topological photonics. Benefiting from the differences in domain walls, we numerically present and experimentally demonstrate a highly integrated multichannel valley topological BS in the microwave regime. Compared with traditional. Antichiral gyromagnetic photonic crystal (GPC) in a honeycomb lattice with the two interpenetrating triangular sublattices A and B magnetically biased in opposite directions can realize antichiral one-way edge states propagating along the same direction at its two parallel edges.



Article Content

Topological Polarization Beam Splitter in Dual-Polarization All ...

The topological valley transport around sharp-bends is also demonstrated for both TE and TM polarizations. Finally, a harpoon-shaped polarization beam splitter is proposed, and the

Robust beam splitter with fast quantum state transfer through a ...

Here, we propose to realize a fast topological beam splitter based on a generalized SSH model by accelerating the quantum state transfer (QST) process essentially limited by adiabatic requirements.

What Are Optical Beam Splitters?

What Are Optical Beam Splitters? Key Takeaways Beam splitters, essential for applications such as teleprompters and holograms, have different types that

Controllable and tunable topological multiport beam splitter in an ...

We demonstrate a controllable and tunable topological beam splitter with a multiport based on the one-dimensional extended Su-Schrieffer-Heeger model, which supports the topological

Multichannel valley topological beam splitter based on different types ...

However, due to the limitations of the design method and structure arrangement, the multichannel valley topological beam splitter (BS) has not yet been much explored. Here, we reveal

Design of a beam splitter based on an adjustable beam-splitting ratio ...

On this basis, a topological beam splitter was designed and analyzed. Results show that the beam splitting ratio obtained by the system is in the wide range of 0.2–3.5.

Ultrahigh Extinction Ratio Topological Polarization

Moreover, it is demonstrated that the polarization beam splitting effect, along with the corresponding performance of the TPBS, exhibits

Topologically protected beam splitters and logic gates

Power splitters designed based on topological photonics have been implemented with various functions, such as photonic integrated logic gate

Beam splitter benefits from topological antichiral edge states

Spin-polarized edge states rely on the construction of photonic pseudospin, whose role is similar to that of electronic spin, to split the beam into different directions. These topological...

Topological beam splitting with a tunable splitting ratio:

Topological beam splitting (BS) based on edge states with unique properties such as unidirectionality, robustness to impurities or defects, and anti

An ultrasmall-size topological dual-polarization beam splitter based on ...

Topological polarization beam splitters (TPBS) have extensive applications in laser systems and optical measurement systems. However, there are few photonic crystal (PC) structures

Configurable topological beam splitting via antichiral gyromagnetic ...

The splitter is compact and configurable, has high transmission efficiency, and allows for multi-channel utilization, crosstalk-proof, and robust against defects and obstacles.

Manipulation of topological beam splitter based on honeycomb

Beam splitter is an indispensable element for modern optical integrated devices and optical networks. Owing to the topological properties of the helical edge states, EM wave can

Multichannel valley topological beam splitter based on different types ...

Here, we reveal the different robustness of four types of domain walls in valley TPCs. Benefiting from the differences in domain walls, we numerically present and experimentally

Topological beam splitter based on 2D PC with different

The structure has promising applications in the field of all-optical integrated circuits and is expected to promote the practical use of photonic

Beam splitter benefits from topological antichiral edge states

Recently, researchers have been investigating novel approaches of beam splitting in the context of topological photonics¹, a burgeoning field that explores the topological properties of

Design and analysis of 2D one-way splitter waveguide based on

Mohammadreza Mehdipoura ¹, Mohammadreza Moeini ², Vahid Ahmadi ^{2*} & Reza Poursalehi ¹ We present a new high-efficiency splitter waveguide design based on photonic topological insulators. The ...

Design of Waveguide Beam Splitter Based on Topological Photonic ...

The topological edge states with different Zak phases are studied by constructing the combined structures of different photonic crystals. The robustness of topological edge states is verified, and a

Beamsplitter Benefits from Topological Antichiral Edge States

Valley-locked edge states can be used to split beams similar to that of electronic spin, to split the beam into different directions. These topological beamsplitters offer unique advantages and

Broadband, robust, and tunable beam splitter based on topological ...

Beam splitters are pivotal components in integrated microwave and photonic systems. However, conventional designs based on directional coupling or multi-mode interference often suffer

Engineering the topological state transfer and topological beam ...

Further, we demonstrate the feasibility of implementing the topological beam splitter based on the circuit quantum electrodynamic lattice. Our scheme opens up a new way for the realization of

Engineering the topological state transfer and topological beam ...

This special topological state transfer channel is expected to realize a topological beam splitter, whose function is to make the initial photon at one position appear at two different positions

Broadband, robust, and tunable beam splitter based on

Moreover, the operating band of the beam splitter can be actively tuned by adjusting the external magnetic field, while its robust and broadband

Broadband, robust, and tunable beam splitter based on topological ...

We show that the beam splitter not only exhibits strong robustness against obstacles but also achieves a broad bandwidth across nearly the entire USMP band with arbitrarily tunable and

Manipulation of topological beam splitter based on honeycomb

Based on the topological edge states theory, we have implemented a topological beam splitter utilizing honeycomb photonic crystals with elliptical rods made of silicon material in this paper.

Beam Splitters – optical power splitter, beamsplitter,

What are Beam Splitters? A beam splitter (or beamsplitter, power splitter) is an optical device which can split an incident light beam (e.g. a laser beam) into two

Beamsplitter Benefits from Topological Antichiral Edge States

The development of this configurable topological beamsplitter has potential applications in telecommunications, optical computing, and sensing, among other areas, according to the

What are Beamsplitters?

Optical components that create two beams by splitting incident light are beamsplitters. Read more about the different types of beamsplitters at Edmund

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