Topological lasers and condensates

Henning Schomerus

Department of Physics, Lancaster University, Lancaster LA1 4YB, UK

h.schomerus@lancaster.ac.uk

Topological photonics aims to replicate fermionic symmetries as feats of precision engineering. Here I show how to enhance these systems via effects such as gain, loss and nonlinearities that do not have a direct electronic counterpart. This leads to a topological mechanism of mode selection [1-4], formation of compactons in flat band condensates [5-8], as well as topological excitations [9]. The resulting effects show a remarkable practical robustness against disorder, which arises from the increased spectral isolation of the manipulated states. Common to them all are structured intensity distributions of the topological modes that correspond to an anomaly. These concepts can be applied to configure self-shielded receiver protectors [10] and directed sensors (see Fig. 1) [11].

References

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Figures

Figure 1: Directed sensing in a nonreciprocal topological metamaterial.