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Hyperbolic Weyl point in reciprocal chiral metamaterial.[1] MENG XIAO, QIAN LIN, SHANHUI FAN, Stanford Univ - Ginzton Lab — Weyl point is a topological singular point in the momentum space. There are two types of Weyl points, type-I and type-II, both are topologically nontrivial but exhibit very different physical properties. In this work, we report the existence of Weyl points in a class of non-central symmetric metamaterials which preserves time reversal symmetry. We break inversion symmetry utilizing chiral coupling between the electric and magnetic fields. The exploration of Weyl point in metamaterials as described by homogeneous effective material parameters is of fundamental interest since the wavevector space of such meta-material is non-compact, which is in contrast with the wavevector space of periodic systems which is always topologically compact. This class of metamaterial exhibits either type-I or type-II Weyl points depending on its non-local response. We also provide a physical realization of such metamaterial consisting of an array of metal wires in the shape of elliptical helixes which exhibits type-II Weyl points. Such meta-material should be relatively straightforward to construct experimentally in both microwave and near-infrared region.

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