# MANIFESTATIONS OF WEYL DISPERSION FOR COLD ATOMS

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Recently a considerable amount of interest has been drawn to quasi-particles exhibiting a three-dimensional dispersion of the Weyl type. In such a dispersion there is a linear dependence of the energy on the momentum together with a Weyl singularity at zero-momentum [1]. The Weyl particles are massless fermions. As of today, no such elementary particles have been discovered in Nature. Yet the Weyl fermions can be simulated in condensed matter [2, 3, 4] and various metamaterials [5, 6], as well as using ultracold atoms [7, 8, 9].

Of significant interest is the behaviour of a Weyl particle in a magnetic field. In that case the zero-energy Landau level becomes chiral, and the particle exhibits a unidirectional motion parallel to the magnetic field. This produces what is called the chiral anomaly [1]. Up to now chiral anomalies have not been studied for cold atoms. In this work we show how a Weyl-like behaviour can be created using cold atoms within an optical lattice. We show that with an appropriate choice of complex tunnelling amplitudes the Weyl Hamiltonian can be derived from the Harper-Hofstadter Hamiltonian, the realization of which is well within experimental reach.

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