

Abstract Submitted
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Chiral charge and orbital order in 1T-TiSe₂¹ JASPER VAN WEZEL, Argonne National Laboratory — Helical arrangements of spins are common among magnetic materials. The first material to harbor a corkscrew pattern of charge density on the other hand, was discovered only very recently [1,2]. The nature of the order parameter is of key relevance, since rotating a magnetic vector around any propagation vector trivially yields a helical pattern. In contrast, the purely scalar charge density cannot straightforwardly support a chiral state. Here we resolve this paradox by identifying the microscopic mechanism underlying the formation of the chiral charge density wave in 1T-TiSe₂. It is shown that the emergence of chirality is accompanied by the simultaneous formation of orbital order [3] We show that this type of combined orbital and charge order may in fact be expected to be a generic property of a broad class of charge ordered materials and discuss the prerequisites for finding chiral charge order in other materials.

[1] J. Ishioka, Y. H. Liu, K. Shimatake, T. Kurosawa, K. Ichimura, Y. Toda, M. Oda and S. Tanda, *Phys. Rev. Lett.* **105**, 176401 (2010).

[2] J. van Wezel and P. B. Littlewood, *Physics* **3**, 87 (2010).

[3] J. van Wezel, arXiv:1106.1930v1 (2011).

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