Condensed Matter Physics Seminar Series

Chirality and Topology in DNA-type Chiral Molecules and Chiral Solids

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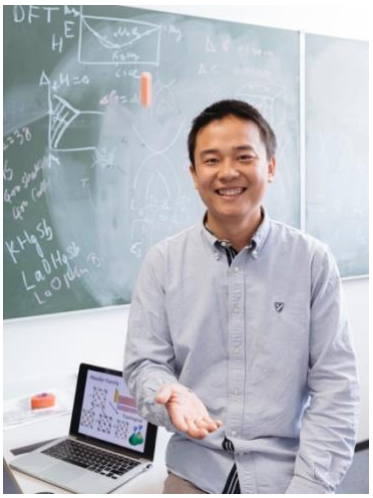

In physics, chirality usually refers to the locking of spin and momentum, such as in Weyl fermions, neutrinos and photons. In chemistry and biochemistry, however, it is the geometric asymmetry of non-superposable mirror images that constitutes chirality. While seemingly unrelated characters in different fields, the chiral geometry can lead to topological electronic properties in chiral molecules or solids, as we recently discovered. This electronic topology is encoded in the orbital nature of the wave function, with an orbital-momentum locking occurring, and leads to unexpected consequences, for example, in molecular spin valve devices and circularly polarized light emitting diodes (LED). The chirality information is transferred from the chiral atomic geometry to electronic orbital/spin, and to the light, which may have broad impacts in fundamental science and technology application.

Binghai Yan is an associate professor in the department of condensed matter physics at the Weizmann Institute of Science, Israel. He is a theoretical physicist and currently interested in topological materials and topology-induced phenomena. After completing his PhD at Tsinghua University in 2008, he worked as a postdoc at Bremen University and later at Stanford University. He was a group leader in the Max Planck Institute in Dresden during 2012-2016 and started his current position at Weizmann Institute since 2017. He was awarded the ARCHES Prize in Germany in 2013, the Israel Physical Society Prize for Young Scientist in 2017, and recognized as a Highly-Cited Researcher every year since 2019.

Friday, March 17th, 2023 at 1:00 PM
4-330 PAB