



### Seminar

## 超导体和自旋电子学中的手征相互作用

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**腾讯会议链接: <https://meeting.tencent.com/s/S1gXvGQli7X1>**

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### Abstract

Chirality is an independent degree of freedom that holds potential in information processing, similar to spin, valley and other quantum degree of freedoms. In this talk, I will address two applications of chirality in superconducting quantum computing and spintronics. Chiral topological superconductors host chiral Cooper pairs and support Majorana modes at the edge. We show the induced interaction between two kinds of chiral Cooper pairs by a laser field in chiral superconductors can switch the chirality of superconductors and optically write the Majorana modes, which is promising in the future quantum computing based on the candidates including twisted bilayer graphene and heavy fermion system [1]. For the spintronics, we universally demonstrate the dynamical chiral coupling--the confined quasiparticle can only interact with the traveling quasiparticles that propagate in one direction--among magnon, photon, phonon, and electron [2-5], which is widely confirmed by recent experiments. The novel chiral dynamics adds functionality to downscaled spintronics devices, such as non-contact spin pumping, unidirectional spin transport, chiral Seebeck effect, magnonic non-Hermitian skin effect, spin blockage/trap with perfect energy/spin transfer between two magnets, nonreciprocal level attraction, and phonon/magnon/microwave photon/electron spin diode effects, to name a few.

#### References:

- [1] **T. Yu**, M. Claassen, D. M. Kennes, and M. A. Sentef, “*Optical Manipulation of Domains in Chiral Topological Superconductors*”, arXiv:2010.00838.
- [2] X. Zhang, G. E. W. Bauer, and **T. Yu\***, “*Unidirectional Pumping of Phonons by Magnetization Dynamics*”, Phys. Rev. Lett **125**, 077203 (2020).
- [3] **T. Yu** and G. E. W. Bauer, “*Noncontact Spin Pumping by Microwave Evanescent Fields*” (Editors’ Suggestion), Phys. Rev. Lett **124**, 236801 (2020).
- [4] **T. Yu**, Y.-X. Zhang, S. Sharma, X. Zhang, Y. M. Blanter, and G. E. W. Bauer, “*Magnon Accumulation in Chirally Coupled Magnets*”, Phys. Rev. Lett. **124**, 107202 (2020).
- [5] **T. Yu**, Y. M. Blanter, and G. E. W. Bauer, “*Chiral pumping of spin waves*”, Phys. Rev. Lett. **123**, 247202 (2019).

### About the speaker

于涛, 2018年4月于中国科学技术大学获得凝聚态物理专业博士学位, 之后在荷兰代尔夫特理工大学, 日本东北大学和德国马克斯普朗克物质结构与动力学研究所从事博士后研究工作。研究专注于超导, 磁性, 半导体和冷原子等关联材料的超快动力学, 非平庸物态和拓扑性质。