



# 第5回トポロジカル物質科学セミナー Topological Material Science Seminar (5)

## **Ising Superconductivity and Majorana Fermions in Transition Metal Dichalcogenides**

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**Place:** Room K202, Yukawa Institute for Theoretical Physics,  
Kyoto University

**Date:** January 15 (Friday), 2016

**Time:** 16:00-

**Abstract:** In monolayer transition metal dichalcogenides (TMDs), electrons in opposite K valleys are subject to opposite effective Zeeman fields, which are referred to as Ising spin-orbit coupling (SOC) fields. The Ising SOC, originated from in-plane mirror symmetry breaking pins the electron spins to the out-of-plane directions, and results in the newly discovered Ising superconducting states with strongly enhanced upper critical fields [1,2,3]. In this talk, we show that the Ising SOC generates equal-spin triplet Cooper pairs with spin polarization in the in-plane directions. Importantly, the spin-triplet Cooper pairs can induce superconducting pairings in a half-metal wire placed on top of the TMD and result in a topological superconductor with Majorana end states. Direct ways to detect equal-spin triplet Cooper pairs and the differences between Ising superconductors and Rashba superconductors are discussed [4].

1. J. M. Lu et al. *Science* 350, 1353 (2015).
2. X. Xi, et al. *Nat. Phys.* doi:10.1038/nphys3538 (2015).
3. Y. Saito et al. *Nat. Phys.* doi:10.1038/nphys3580 (2015).
4. T. Zhou, H.-L. Jiang, N. F.Q. Yuan and K. T. Law arXiv:1510.06289.