

Magnetoresistance in an α -RuCl₃/Pt

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Recently an α -RuCl₃ has emerged as a primal candidate for hosting a Kitaev Quantum Spin Liquid [1] and has been attracting great attentions. In this study, we investigated the magnetoresistance [2] in Pt/ α -RuCl₃ bilayers at low temperatures where the Kitaev QSL state and zigzag antiferromagnetic state [3] are expected to emerge.

We transferred an α -RuCl₃ flake on a SiO₂ substrate by exfoliating with the Scotch tape and then deposited 3 nm-thick Pt on top of it. The bilayer was patterned into a 50 μ m wide Hall bar using e-beam lithography technique. We performed spin transport measurements at different temperatures between 3 and 75 K with a rotating magnetic field $H = 9$ T. The rotation angles (α, β, γ) and the measurement configurations are defined in Fig. 1(a). Fig. 1(b) shows the temperature dependence of magnetoresistance normalized to the base corresponding resistance ($\Delta R_{xx}/R_{xx} = \Delta \rho_{xx}/\rho_{xx}$) obtained for the three field rotations. Below 50 K, $\Delta \rho_{xx}/\rho_{xx}$ increase with decreasing temperature for both $-\beta$ and $-\gamma$ rotations. In the presentation, we will discuss the temperature dependence of $\Delta \rho_{xx}/\rho_{xx}$ with respect to the temperature dependence of magnetic state of an α -RuCl₃.

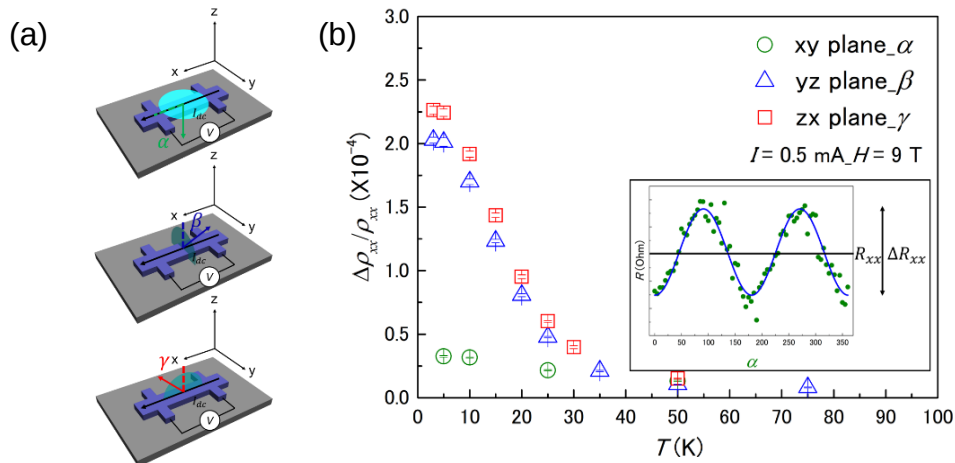


Fig. 1 (a) The measurement configurations. (b) Temperature dependence of $\Delta \rho_{xx}/\rho_{xx}$ obtained at 9 T. Inset: the angular dependence of the longitudinal resistance $R_{xx}(\alpha)$ at 5 K.

[1] A. Kitaev, Ann. Phys. **321**, 2 (2006).

[2] H. Nakayama *et al.*, Phys. Rev. Lett. **110** 206601 (2013).

[3] R. D. Johnson *et al.*, Phys. Rev. B **92** 235119 (2015).