Charge properties in thin films of the Kitaev Candidate material α-$RuCl_3$

Session number, Oral

Zheng-Xin Liu, Xiao-Hu Zheng, Rui-Rui Du, etc.

1 Affiliation1 [Times Roman regular font 11 pt]

2 Affiliation2

3 Affiliation3, etc.

Spin-orbit coupled quantum magnets on the Honeycomb lattice, including the material α-$RuCl_3$ and $Na_2Co_2TeO_6$, have attracted lots of research interest due to the existence of Kitaev exchange interactions. While most studies of Kitaev materials have been focused on their magnetic properties, including the effective interactions and field induced quantum spin liquids, the charge properties are also interesting. Recent STM experiment on few layered α-$RuCl_3$ on the substrate of graphite observed an induced Mott charge gap and the emergence of incommensurate charge super-modulation. We try to attribute the the reduced Mott charge gap to the formation of charge transfer insulator, and interprete the observed incommensurate charge super-modulation from the viewpoint of electric-dipole order. Our work may shed light on study of multiferroic properties of Kitaev candidate magnets.

After introducing recent STM data of few layered α-$RuCl_3$ on the substrate of graphite, we will try to interpret the reduced Mott charge gap in 2- and 3-layered samples, and then provide a possible explanation of the observed incommensurate charge super-modulation from the viewpoint of electric-dipole order. Our work may shed light on study of multiferroic properties of Kitaev candidate magnets. Exhibit long-range magnetic order at low temperatures, theoretical investigation of the effective spin models is helpful for experimental realization of exotic magnetic phases. In the first part of the talk, we will introduce the theoretical study of field induced quantum spin liquids motived by recent experiments on α-RuCl3. In the second part,