Resonant x-ray scattering study of a Kitaev quantum magnet

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Enormous interests generated by graphene physics have made honeycomb lattice one of the most studied two-dimensional lattice structures in recent years. In particular, the realization that a bond-dependent anisotropic magnetic interaction called Kitaev interaction can be found in honeycomb lattice materials with strong spin-orbit coupling has made a profound impact on quantum magnetism research. In this talk, we will give an overview of recent experimental progress made in understanding a class of honeycomb lattice quantum magnets called Kitaev quantum spin liquids with a special emphasis on alpha-RuCl3. In our recent resonant X-ray scattering study, we were able to determine the magnetic interaction Hamiltonian of this intriguing material completely. In addition to the Kitaev interaction, we found that the symmetric off-diagonal exchange interaction is substantial in this material, which provides a natural explanation for the large anisotropy of the magnetic susceptibility in alpha-RuCl3.
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