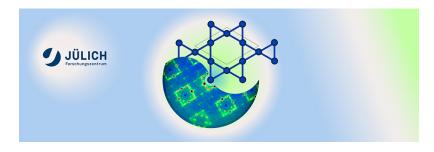
JCNS Workshop 2025, Trends and Perspectives in Neutron Scattering. Quantum Materials: Theory and Experiments



Beitrag ID: 73 Typ: Invited talk

Ruthenium-Chlorine hybridization in alpha-RuCl3

Mittwoch, 8. Oktober 2025 09:00 (30 Minuten)

In the last decade, alpha-RuCl3 has been extensively studied as a possible realization of the Kitaev quantum spin liquid state. However, the Kitaev model alone is insufficient to describe the magnetism in the material, and additional off-diagonal terms and Heisenberg interactions are known to be present. In addition, it is necessary to account for longer-range interactions arising from the itinerant aspect of electrons in this system. It has been known for some time that third-neighbour interactions are required to stabilize the zigzag magnetic order in this system. A recent modelling of the neutron magnetic form factor also found a substantial hybridization of Ru and Cl ions. In order to directly probe the role of chlorine in the magnetic ground state of alpha-RuCl3, we have carried out resonant elastic X-ray scattering (REXS) measurements at the Cl K-edge. We observed resonant enhancement of the magnetic Bragg peaks, indicating the presence of a magnetic moment on the Cl site. The temperature dependence of the resonant Bragg peaks matches that of the Ru edge, suggesting a similar magnetic origin. Our measurements provide evidence for the importance of Cl covalency to magnetism in alpha-RuCl3.

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