α-RuCl₃ has been identified as an intriguing platform for studying Kitaev quantum spin liquid physics, with a field-induced state exhibiting the quantized thermal Hall effect, interpreted as the signature of an edge mode of fractionalised Majorana fermions [1]. A surprising recent result claims that it may host a 3D Fermi surface of neutral quasiparticles, giving rise to quantum oscillations of the thermal conductivity [2]. However, many fundamental material properties are still under debate, including the reproducibility of low temperature thermal transport and even the low temperature crystal structure including the role of stacking faults [3].

In this talk, I will present our recent thermal Hall and thermal conductivity studies on α-RuCl₃. We observed a large thermal Hall effect over a wide range of temperatures and fields, with a magnitude consistent with half-quantization [4]. However, $k_{XY}/T$ is suppressed at low temperature, and we discuss to what extent it can be said to exhibit a ‘plateau’. We also report a sequence of field-dependent features in thermal conductivity, where detailed analysis shows that they are not quantum oscillations but likely caused by magnetic transitions in secondary crystal phases, such as stacking faults [5].

[3] e. g: H.B. Cao et al., PRB 93, 134423 (2016)