

## CONDENSED MATTER THEORY SEMINAR

- Subject: **Dirac and chiral quantum spin liquids in  $\alpha$ -RuCl<sub>3</sub>**
- Speaker: **Bruce Normand (Neutrons and Muons Research Division, Paul Scherrer Institute, CH-5232 Villigen-PSI, Switzerland)**
- Date & time: **Friday, May 4<sup>th</sup>, 2018 at 3.15 p.m.**
- Venue: **Seminar room 1.114**
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$\alpha$ -RuCl<sub>3</sub> is considered to be a leading candidate material for the appearance of physics related to the Kitaev quantum spin liquid (QSL). Motivated by the recent experimental observation of a field-induced QSL phase with gapless spin excitations, we study the K- $\gamma$  model on the honeycomb lattice in an external magnetic field. By a slave-particle representation and Variational Monte Carlo calculations, we reproduce the phase transition from zigzag magnetic order to the field-induced QSL. The nature of this phase depends crucially on the field orientation. For particular field directions in the honeycomb plane, we find a gapless Dirac spin liquid, in full agreement with experiment. For a range of out-of-plane fields, we predict the presence of a chiral spin-liquid phase, which would show a quantised thermal Hall effect.