Title: NMR spectra of charge-density-wave states in GaAs/AlGaAs quantum wells and ^{13}C-enriched graphene

By: René Côté, Université de Sherbrooke et Institut quantique

Abstract:

It is well established that the two-dimensional electron gas (2DEG) in GaAs/AlGaAs quantum wells and in graphene hosts a variety of charge-density-wave (CDW) states such as the quantum Hall stripe phase and the Wigner, bubble and Skyrme crystals when subjected to a strong perpendicular magnetic field. It has been shown experimentally (GaAs/AlGaAs 2DEG) that the spin modulation in such non-uniform states have a clear signature in nuclear magnetic resonance (NMR) spectra [1]. Different crystal shapes cause different inhomogeneous broadening of the NMR line shape. In this talk, we present a theoretical calculation of the line shape of several inhomogeneous states of the 2DEG in both GaAs/AlGaAs quantum wells and graphene based on an Hartree-Fock description. In particular, we consider states with a topological spin texture such as Skyrme and meron crystals. For graphene, we assume that it is strongly enriched with ^{13}C isotope since^{12}C has no nuclear spin. We discuss how the coupling with the nuclear spins differs in GaAs/AlGaAs and graphene and then show that this difference leads to different line shapes for the same CDW state in the two systems.

[1] L. Tiemann, T. D. Rhone, N. Shibata, and K. Muraki, Nat. Phys. **10**, 648 (2014).