



# CONDENSED MATTER THEORY SEMINAR

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## Oxide heterostructures: Impact of spin-orbit coupling and strain.

Prof. Arun Paramakanti, University of Toronto

Tuesday, July 10, 2018, 11:00-12:00

WHGA/121 (PSI-West)

### Abstract:

Recent progress in making oxide interfaces and heterostructures has led to an interest in understanding how one might realize topological phases or flat bands in such correlated systems. In this context, I will discuss our theory work on understanding the "atomic limit" of spin-orbit coupled oxides, showing that one can use resonant inelastic X-ray spectroscopy of such systems to extract microscopic couplings such as spin-orbit coupling and Hund's coupling. Based on such "lego" building blocks, I will discuss mixed oxide 2DEGs comprised of local moments coupled to a "conduction fluid" of electrons with strong spin-orbit coupling, to show that one can realize high temperature quantum anomalous Hall insulators. I will also discuss a different setting in which strain in Dirac materials acts as a pseudo-gauge field. This provides a way to realize Landau-like levels of Bogoliubov quasiparticles in high T<sub>c</sub> d-wave superconducting oxides. Spin-orbit coupling and strain can thus pave the way to realizing novel topological quantum phases in solids.

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