Institute for Advanced Study, Tsinghua University

Title: **Strong Correlation Effects in Silicene and Germanene**

Speaker: **Prof. G Baskaran**
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Time: **3:00pm, Monday, June 9, 2014**

Venue: **Conference Hall 322, Science Building, Tsinghua University**

Abstract

Combining theoretical considerations and certain striking phenomenology we predict silicene and germanene to be narrow gap Mott insulators and abode of quantum spin liquids and unconventional superconductivity. A weaker pi-bond, because of a 60 % bond stretching, from ~ 1.4 Au in graphene to ~ 2.3 Au in silicene renders Mott localization. A quantum theoretical analysis is value to prov

Insulator modeling. A i) a narrow band of width ~ 1 eV lying bel

ZrB2, ii) a superconducting gap seen below 35 K with a large

ii) emergence of electron like pockets at M points on electr

absence of Landau level splitting up to 7 Tesla and v) superstructures, not common in graphene but ubiquitous in silicene. A synthesis of the above results using theory of Mott insulator, with and without doping, is attempted. We surmise that if competing orders are taken care of and optimal doping achieved, superconductivity in silicene and germanene could reach room temperature scales [1], as our estimates of tJ model parameters, t and J ~ 1 eV, are encouragingly high.

[1] G. Baskaran, arXiv:1309.2242