



The Abdus Salam
**International Centre
for Theoretical Physics**



**Conference on Frontiers of Nanoscience
24 August - 1 September 2015, Trieste, Italy**

Polaritons in Interacting Gases

Alex EDELMAN¹ and **Peter LITTLEWOOD**^{1,2}

¹University of Chicago, Chicago USA

²Argonne National Laboratory, Argonne IL USA

Abstract:

Cavity polaritons in semiconductors have become an interesting laboratory to study the development of coherence in light-matter systems. Much of the work to date has focused on III-V and II-VI systems where the interaction between light and electron-hole pairs can be strong, but the excitons are weakly interacting both with each other and with other excitations in the system. In atomic systems where the excited state is a highly excited Rydberg atom, there are long-range repulsive interactions between excitons, in addition to the photon-mediated hopping. We will present a theoretical study of the phase diagram, including the transition between polariton solid and polariton superfluid.