

Quantum Fluids of Matter and Light in a Designable Microcavity

Prof. Hui Deng
University of Michigan

Thursday, November 7 ♦ 4:00 P.M.
Room 184 Nieuwland Science Hall

P. Anderson once pointed out emergent phenomena in quantum degenerate manybody systems as a new science for the modern era in the hierarchy of sciences.[1] Examples of such systems include superfluids, superconductors, ultra-cold atomic gasses, and most recently--the light-matter hybrid system of microcavity exciton-polaritons.

I will review in this talk the special properties of polaritons and recent research activities on 2D polariton condensation and lasing.[2] I will then introduce an unconventional hybrid cavity structure, designed to engineer the properties of polaritons, including their polarization, dimensionality, and effective mass [3]. Such a new cavity-polariton system provides a sandbox for novel manybody physics.

[1] Anderson, P. W. More is Different. *Science* 177, 393–396 (1972).

[2] Deng, H., Haug, H. & Yamamoto, Y. Exciton-polariton Bose-Einstein condensation. *Rev. Mod. Phys.* 82, 1489 (2010).

[3] Zhang, B., Wang, Z., Brodbeck, S., Schneider, C., Kamp, M., Hoefling, S. & Deng, H. Zero Dimensional Polariton Laser in a Sub-Wavelength Grating Based Vertical Microcavity. *Light: Science & Applications*, in press (2013). <http://arxiv.org/abs/1304.2061>