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Superfluids of Light

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Polaritons in microcavities can be viewed as dressed photons— light interacts with electronic states in a solid in such a way that the photons have an effective mass and repulsive interactions. Because they are bosons, they can undergo Bose-Einstein condensation at low temperature and become superfluid. It is now routine to make polariton condensates, including in thermal equilibrium, with demonstrations of such canonical effects as quantized vortices, Josephson oscillations, and phase locking of two condensates. We can also now easily see transport of polariton condensates over long distances of hundreds of microns, allowing the possibility of polaritonic circuits. I will present recent work on flow of polariton condensates in one-dimensional channels and circular rings, and discuss recent work on creating polariton condensates at room temperature.

David Snoke received his PhD in physics from the University of Illinois at Urbana-Champaign. He has worked for The Aerospace Corporation and was a visiting scientist and Fellow at the Max Planck Institute. In 2006, he was elected a Fellow of the American Physical Socieity. His research has focused on basic processes and phase transitions of electrons, holes, including non equilibrium dynamics of electron plasma and excitons, the Mott transition from exciton gas to electron-hole plasma and Bose-Einstein condensation of excitons and polaritons. His research group at the University of Pittsburgh uses stress to trap excitons in confined regions, similar to the way atoms are confined in traps for Bose-Einstein condensation experiments.

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