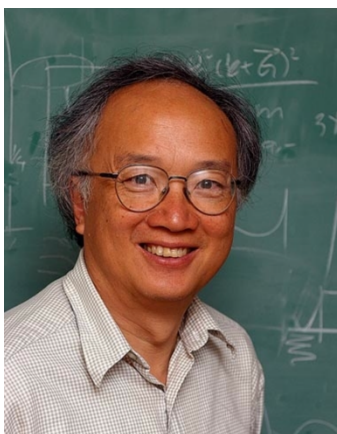


Condensed Matter Physics Seminar Series

A controlled path to high temperature superconductor via repulsive interaction in a spin polarized band

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Can electrons with a purely repulsive interaction form Cooper pairs? The positive answer was provided 60 years ago by Kohn and Luttinger using the singularity in $2k_F$ scattering, but the transition temperature is very low. Many believe that high T_c superconductors have their origin in electron correlation due to repulsion, but a controlled theory is lacking. In a collaboration with Zhiyu Dong (<https://arxiv.org/abs/2511.17466>), we find that the problem simplifies for a spin polarized band. In many cases it is possible to perform a controlled perturbation expansion, despite starting with a strong repulsion. I will illustrate this with several examples, some of which hold promise for high T_c .

Patrick A. Lee is a professor of physics at the Massachusetts Institute of Technology (MIT). After spending ten years with the Theoretical Physics Department at Bell Laboratories, Lee joined MIT in 1982. He has contributed to the field of "mesoscopic physics," or the study of small devices at low temperatures. He has also made important contributions to the theory of disordered electronic systems, among them the concept of universal conductance fluctuations. He was awarded the 2005 Dirac Medal of the International Centre for Theoretical Physics as well as the Oliver Buckley Prize of the American Physical Society. He is currently researching high temperature superconductors.

**Friday, December 5th at 10am
4-330 PAB**