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Quantum Monte Carlo Study of Superconductivity on the Lieb Lattice¹ VLADIMIR IGLOVIKOV, RICHARD SCALETTAR, Physics Department, University of California, Davis, FRÉDÉRIC HÉBERT, GEORGE BARTROUNI, Institut Non-Lineaire de Nice, University of Nice, France — The attractive fermion Hubbard model on a square lattice is known to have a finite temperature (Kosterlitz-Thouless) transition to a superconducting ground state away from half-filling. This talk presents determinant Quantum Monte Carlo results for pairing correlations on a “Lieb lattice,” which is obtained from the square lattice by regular pattern removal of 1/4 of the sites. The Lieb lattice has two dispersing bands, and one flat band. We will show how superconductivity differs when the chemical potential lies in the flat band. For large values of the on-site attractive interaction, the fermions form tightly bound bosonic pairs. In that limit, our work addresses the nature of Bose-Einstein condensation when the non-interacting band structure has no wave-vector which minimizes the energy.

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Vladimir Iglovikov
Physics Department, University of California, Davis

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