1145-35-1945 **Kay Kirkpatrick*** (kkirkpat@illinois.edu). *Long-range Schrödinger Dynamics.*

We want to justify certain model equations proposed in the biophysics literature for charge transport on polymers like DNA and protein, so we consider a general class of discrete nonlinear Schroedinger equations on lattices, and prove that in the continuum limit, the limiting dynamics are given by a nonlinear Schroedinger equation (NLS) with a fractional Laplacian. In particular, a range of fractional powers arise from long-range lattice interactions in this limit, whereas the usual NLS with the non-fractional Laplacian arises from short-range interactions. We also obtain equations of motion for the expected position and momentum, the fractional counterpart of the well-known Newtonian equations of motion for the standard Schroedinger equation, and use a numerical method to suggest that the nonlocal Laplacian introduces decoherence, but that effect can be mitigated by the nonlinearity. Joint work with Gigliola Staffilani, Enno Lenzmann, Yanzhi Zhang, Peter Hislop, Stefano Olla, and Jeffrey Schenker. (Received September 24, 2018)