Abstract Submitted
for the MAR06 Meeting of
The American Physical Society

Kac-Dirac propagators modeling crossover between entangled and unentangled conformations in polymer melts YITZHAK SHNIDMAN, College of Staten Island, City University of New York — We will discuss the advantages of using the Kac stochastic process on a lattice for modeling the statistics of chain conformations in polymers melts. Certain projections of the master equation governing such a process assume the form of the telegrapher's equation in the continuum limit, while other projections assume the form of Dirac's equation for free fermions that can also be recast as the Klein-Gordon equation. The statistics of ideal chain conformations and the onset of entanglement in a dense polymer melt will be related to the finite path statistics and the onset of quantum entanglement in a system of free fermions. A persistence length above the Kuhn length scale emerges naturally in the entangled regime without assuming a confining tube as in the Doi-Edwards theory. Kac-Dirac propagators may also provide a better description than Wiener-Schroedinger propagators for conformations of interacting chains across interfaces in inhomogeneous polymer fluids.

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Date submitted: 02 Dec 2005 Electronic form version 1.4