Abstract

We present some computer simulations run on a stochastic CA (cellular automaton). The CA simulates a gas of particles in a D1 channel, with two reservoirs located at the boundaries. The evolution in the channel simulates a lattice gas with Kawasaki dynamics with attractive Kac interactions; the temperature is chosen smaller than the mean field critical. There are also exchanges of particles between the channel and the reservoirs and among reservoirs. When the rate of exchanges among reservoirs is in a suitable interval the CA reaches an apparently stationary state with a non-zero current; for different choices of the initial condition the current changes sign. We have a quite satisfactory theory of the phenomenon, but we miss a full mathematical proof. This talk is based on a joint work with Errico Presutti (Gran Sasso Science Institute, Italy) and Anna De Masi (University of L'Aquila) [1,2]."

References:
[1] Colangeli M., De Masi A., Presutti E., Latent heat and the Fourier law, Physics Letters A 380, 1710 (2016).
[2] Colangeli M., De Masi A., Presutti E., Xiv: 1606.04920 (2017).