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About the appearance of entropy and irreversibility in reversible dynamical systems.

**ABSTRACT:**

In this talk I want to present several classical and less classical examples to contribute to the understanding of the role of scaling and randomness in the appearance of entropy and irreversibility.

The simplest idea is the diffusion limit for the Lorentz equation. Next one should observe that the derivation of the Lorentz equation for system of particles interacting with obstacles has been validated by Galavotti under a randomness hypothesis. Such derivation turns out to be wrong when the obstacles are on a periodic lattice (Golse Bourgain Weinberg).

On the other hand in the linear setting the diffusion limit has been obtained (under a finite horizon hypothesis) by Sinai and Bunimowich and I want to present a “baby model” of such derivation obtained with Golse.

Two others observations have to be added.

1) In the Landford derivation of the Boltzmann equation the fact that the problem is genuinely non linear “helps” in the convergence.

2) To overcome the obstruction in the case of the Golse Bourgain Weinberg example one introduce a “non markowian closure” and this shares some similarities with what is done (with absolutely no proof ) in turbulence with the so called k-epsilon model.