Thermostated Kac model with rescaling

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We consider the thermostated Kac model, which describes the evolution of the velocity distribution of particles in a one-dimensional spatially homogeneous caricature of a gas, represented as a large collection of identical particles undergoing random energy-preserving binary collisions and also interactions against an external thermostat. In this work we introduce a rescaling mechanism on the model, which has the effect of restoring the total energy, and produces an additional drift term in the associated kinetic equation. We prove convergence towards a unique equilibrium distribution, which exhibits properties that can differ from the classical Gaussian equilibrium. We also study a finite N-particle system approximation, and prove that it satisfies the propagation of chaos property: as $N \to \infty$, the empirical measure of the system converges to the solution of the kinetic equation.