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TITLE: On Strong Convergence to Equilibrium for the Boltzmann Equation with Soft Potentials

ABSTRACT:

The paper concerns  $L^1$ -convergence to equilibrium for weak solutions of the spatially homogeneous Boltzmann Equation for soft potentials ( $-4 \leq \gamma < 0$ ), with and without angular cutoff. We prove the time-averaged  $L^1$  convergence to equilibrium for all weak solutions whose initial data have finite entropy and finite moments up to order greater than  $2 + |\gamma|$ . For the usual  $L^1$ -convergence we prove that the convergence rate can be controlled from below by the initial energy tails, and hence, for initial data with long energy tails, the convergence can be arbitrarily slow. We also show that under the integrable angular cutoff on the collision kernel with  $-1 \leq \gamma < 0$ , there are algebraic upper and lower bounds on the rate of  $L^1$ -convergence to equilibrium. Our methods of proof are based on entropy inequalities and moment estimates. This is joint work with E. A. Carlen and Xuguang Lee.