

Global well-posedness of the Boltzmann equation with large amplitude initial data

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Abstract

The global well-posedness of the Boltzmann equation with initial data of large amplitude has remained a long-standing open problem. In this paper, by developing a new $L_x^\infty L_v^1 \cap L_{x,v}^\infty$ approach, we prove the global existence and uniqueness of mild solutions to the Boltzmann equation in the whole space or torus for a class of initial data with bounded velocity-weighted L^∞ norm under some smallness condition on $L_x^1 L_v^\infty$ norm as well as defect mass, energy and entropy so that the initial data allow large amplitude oscillations. Both the hard and soft potentials with angular cut-off are considered, and the large time behavior of solutions in $L_{x,v}^\infty$ norm with explicit rates of convergence is also studied.