

# Euler-Poisson equation - weak-strong uniqueness principle for dissipative measure-valued solutions

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## Abstract

We will start with the statement of weak-strong uniqueness principle for general hyperbolic conservation laws and show that Euler-Poisson fails to fit into this framework. We consider several pressureless variants of the compressible Euler equation driven by nonlocal repulsion-attraction and alignment forces with Poisson interaction. Under an energy admissibility criterion, we prove existence of global *measure-valued solutions*, i.e., very weak solutions described by a classical Young measure together with appropriate concentration defects. We then investigate the evolution of a relative energy functional to compare a measure-valued solution to a regular solution emanating from the same initial datum. This leads to a (partial) weak-strong uniqueness principle.