Return to Equilibrium in Homogeneous Bosonic Boltzmann–Nordheim Equation with Condensate

JOGIA BANDYOPADHYAY
UC Davis

Abstract. We consider the kinetic theory of a three-dimensional fluid of weakly interacting bosons in a non-equilibrium state which includes both normal fluid and a condensate. More precisely, we study the previously postulated non-linear Boltzmann–Nordheim equations for such systems, in a spatially homogeneous state which has an isotropic momentum distribution. Elaborating on earlier works, we propose a definition of the coupled equations which, in principle, allows for creation and annihilation of the condensate. For these equations the thermal equilibrium states are stationary. We study the global existence and uniqueness of solutions of these equations, as a problem about return to equilibrium from a perturbation of a thermal state with condensate. The evolution equations have a rich mathematical structure and the main challenge here comes from the singular collision operator.

This is a joint work with Antti Kupiainen and Jani Lukkarinen.