Nonlinear models of kinetic type: On the Cauchy problem and Banach space regularity for Boltzmann flows of monatomic gas mixtures

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This talk will focus on the analysis of kinetic models for multi-component mixtures of monatomic gases with different masses. The model corresponds to a Boltzmann system for the evolution of vector valued distribution function. The collision or interaction law, as much as the modelling of the transition probability rates for pairwise interactions, are crucial components in the dynamics.

We will present some recent rigorous results for the full non-linear space homogeneous Boltzmann system of equations describing multi-component monatomic gas mixtures for binary interactions. More precisely, we will show existence and uniqueness of the vector value solution in the case of hard potentials and integrable angular scattering kernels associated to each pair of interacting species, by means of an existence theorem for ODE systems in Banach spaces. In addition, we will present several properties for such a solution, including integrability properties of the multispecies collision operator. These properties together with a control by below imply propagation of the polynomially and exponentially weighted L^p norms, $1 \leq p \leq \infty$, associated to the system solution. Additionally, for $p = 1$ we have generation of such moments.