

Asymptotic Behavior of systems of PDE arising in physics and biology:  
theoretical and numerical points of view (ABPDE III)

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## Particle Micro-Macro schemes for collisional kinetic equations in the diffusive scaling

*Friday, August 31, 2018 9:30 AM (45 minutes)*

In this talk, I will present a new asymptotic preserving scheme for kinetic equations of Boltzmann-BGK type in the diffusive scaling. The scheme is a suitable combination of micro-macro decomposition, the micro part being discretized by a particle method, and Monte Carlo techniques. Thanks to the Monte Carlo particle approximation, the computational cost of the method automatically reduces when the system approaches the diffusive limit. However, this approximation requires a splitting between the transport part and the collisional one, so that both stiff terms can not offset each other a priori, which prevents from uniform stability. That is why we propose a suitable reformulation of the micro-macro system, without stiff terms. The scheme will be presented in detail and illustrated by several numerical results (including in the 3D in space - 3D in velocity framework).

This work is a collaboration with Nicolas Crouseilles, Giacomo Dimarco and Mohammed Lemou.

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