



# THE UNIVERSITY OF CHICAGO

## COMPUTATIONAL AND APPLIED MATHEMATICS COLLOQUIUM

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IRENE M. GAMBA  
Department of Mathematics  
The University of Texas at Austin

### Computational Deterministic Solvers for Chapman Kolmogorov Transport Equations for Binary Interactions

THURSDAY, April 12, 2018, at 5:00 PM  
Jones 226, 5747 South Ellis Avenue

#### ABSTRACT

Binary interacting particle transport, or kinetic collisional modeling, was introduced in the last quarter of the nineteenth century by L. Boltzmann giving birth to the area of Statistical Physics. This area raised by the search on establishing connections between thermodynamics and the dynamics of interacting particles or molecules in a probabilistic framework.

These types of evolution models concern a broad class of non-local, non-linear integro-differential problems that can be framed in the modern Chapman-Kolmogorov models from a probabilistic approach, whose rigorous mathematical treatment and approximations are still emerging in comparison to classical non-linear PDE theory. Their applications range from rarefied elastic and inelastic gas dynamics, including very low temperature regimes for quantum interactions, collisional plasmas and electron transport in nanostructures, to self-organized or social interacting dynamics. These models share a Markovian framework of birth and death processes, under the regime of molecular chaos propagation. Their evolution and transport are usually described by equations of Boltzmann or Fokker-Plank-Landau type for binary interactions.

We will discuss recent progress in analytical and numerical methods covering from initial and boundary value problems, to long time dynamics, to stability and error estimates issues.

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#### Organizers:

Risi Kondor, Departments of Computer Science and Statistics, [risi@galton.uchicago.edu](mailto:risi@galton.uchicago.edu)  
Lek-Heng Lim, Department of Statistics, [lekheng@galton.uchicago.edu](mailto:lekheng@galton.uchicago.edu)  
Jonathan Weare, Department of Statistics and The James Franck Institute, [weare@uchicago.edu](mailto:weare@uchicago.edu).  
CAM Colloquium URL: <https://cam.uchicago.edu/seminars/colloq/index.shtml>.

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