Kinetic Lecture Series

by

Professor Lingbing HE

Tsinghua University

Abstract. In this short mini-cousre, I will present the mathematical analysis on the so-called grazing collisions limit, which enables to derive the Landau equation from Boltzmann equation under the proper scaling on the collision kernel.

The cousre will divived into three parts. The first part is devoted to the introduction of these two equations and the formal computation on the grazing collision limit(see [1]). Then I will outline the rigorous proof due to Villani on the spatially homogeneous case in the weak topology framework(see [4]). The second part is to justify such limit in the weighted Sobolev spaces which is based on the work(see [2]). The final part is to explain Landau's original work and give the rigorous proof for his formal computation in the inhomogeneous setting but in a short time(see [3]).

REFERENCES

[1] Laurent Desvillettes. On asymptotics of the Boltzmann equation when the collisions become grazing. Transport Theory and Statistical Physics, 21(3):259–276, 1992.
[2] He, Lingbing, Asymptotic analysis of the spatially homogeneous Boltzmann equation: grazing collisions limit. J. Stat. Phys. 155 (2014), no. 1, 151–210.
[3] L. He and X. Yang. Well-posedness and asymptotics of grazing collisions limit of Boltzmann equation with Coulomb interaction. *SIAM J. Math. Anal.*, 46(6):4104–4165, 2014.
[4] C. Villani. On a new class of weak solutions to the spatially homogeneous Boltzmann and Landau equations. *Arch. Rat. Mech. Anal.*, 143(3):273–307, 1998.

DEPARTMENT OF MATHEMATICAL SCIENCES, TSINGHUA UNIVERSITY, BEIJING, CHINA
Email address: hlb@tsinghua.edu.cn

Part I

Date & Time : September 18, 2020 ; 2:30pm ~ 4:30pm (Hong Kong SAR)
Join Zoom Meeting
https://cuhk.zoom.us/j/96644409472?pwd=ZUtiUGZrbFZ3d0ZxWXlscWNja2xLQT09

Meeting ID: 966 4440 9472
Passcode: 519095

Part II

Date & Time : September 25, 2020 ; 2:30pm ~ 4:30pm (Hong Kong SAR)
Join Zoom Meeting
https://cuhk.zoom.us/j/95085816026?pwd=RHR2STduenhyRTJQaSt1YU9lSkxJUT09

Meeting ID: 950 8581 6026
Passcode: 061702

Part III

Date & Time : September 30, 2020 ; 2:00pm ~ 4:00pm (Hong Kong SAR)
Join Zoom Meeting
https://cuhk.zoom.us/j/98157541038?pwd=OEtMeGxaNzk4N1RmNS9taURqbHVRdz09

Meeting ID: 981 5754 1038
Passcode: 471231

All are Welcome