

Final report for the Junior Hausdorff Trimester Program “Kinetic Theory”, 17-21 June, 2019

In June 2019, we participated in the Junior Hausdorff Trimester Program on Kinetic Theory, and successfully organised a workshop on the topic of “Analytical and Computational Problems for Mixtures and Plasma Dynamics”. The organizers are Milana Pavic-Colic, Irene M. Gamba and Liu Liu.

As it is known, modern applications of kinetic equations of collision all type, such as the Boltzmann or Fokker-Planck-Landau equations and models arising in mesoscopic modeling range from rarefied gas mixing and plasma dynamics, to quantum-statistical systems. There are existing and new challenges both in non-linear analysis and numerical approximations, including problems of multi-scale and multi-physics or with uncertainties. We brought together a broad group of researchers with diverse interests to explore and discuss recent progress in these topics.

The speakers of our workshop include both junior and senior distinguished experts in the fields. Here is a full list: Lingbing He, Chiara Saffirio, Berenice Grec, Laurent Boudin, Sergio Simonella, Irene M. Gamba, Jeffrey Haack, Christian Klingenberg, Alexander Bobylev, Liu Liu, Erica Belen De La Canal, Marina Ferreira, Alessia Nota, Shi Jin, Marlies Pinner, Helene Hivert, Helge Dietert, Maxine Herda, Francesco Salvarani, Gernot Heißel, Jang Jin Woo, Anna Szczekutowicz, Raphael Winter, Esther S. Daus, Sonia Akopian and Francois Golse. Though the workshop was held on June 17-21 (except for 20), many of us spent a few days or up to weeks at the Hausdorff Institute and actively participated in frequent academic activities held by this Trimester Program.

We acknowledge the great support of providing this extraordinary platform, both financially and spiritually, by the Hausdorff Institute at University of Bonn for us to organise the workshop, meet new friends, get enlightened through communicating with other researchers, as well as explore potential new collaborations. The generous financial support, especially for junior researchers, really meant a lot. The spacious office space and facilities, high quality coffee and cakes, and the valuable opportunities to meet and interact with both junior and senior scientists from various aspects of kinetic theory, including both analysis and numerical computations, was sincerely and highly appreciated. Our group and visitors were based in several offices in the Hausdorff building, allowing us frequent interactions and a vibrant and exciting discussion atmosphere. The discussions sparked by gatherings and seminars have led to several on-going projects among ourselves, such as conducting error estimates

of efficient numerical methods for multi-species kinetic models with uncertainties and practical applications, developing analysis and numerical simulations for plasma or quantum systems, studying interacting particle systems and quantum dynamics, etc.

Last but not least, our group acknowledges deeply the excellent working and accommodation conditions provided by the Hausdorff Research Institute for Mathematics (HIM). We are particularly grateful for the generous funding chances given to organise the workshop and support our visiting, which especially meant significantly for junior researchers on their academia career developments.