(light) PhD seminar

4th December 2018, 17:30
Seminar Room, BCAM

# On a Boltzmann equation for Compton scattering with a low-density electron gas at non-relativistic equilibrium

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In this talk, we present a Boltzmann equation that is commonly used to describe the time evolution of the distribution function along the energy spectrum of a homogeneous and isotropic photon gas that interacts only through Compton scattering with a low-density electron gas at non-relativistic equilibrium.

The kernel in the kinetic equation is very singular, and we introduce a truncation motivated by the very-peaked shape of the kernel along the diagonal. With this modified kernel, the existence of measure-valued weak solutions is proved for a large set of initial data.

In order to understand some qualitative properties of the solutions, we consider a simplified equation, introduced by Y. B. Zel'dovich and coauthors, where only the quadratic terms are kept.

Two existence results are then established for this simplified equation. On the one hand, measure-valued weak solutions are proved to exist for a large set of initial data, and on the other hand, the existence of $L^1$ solutions is proved for initial data satisfying a strong integrability condition near the origin.

Finally, the long-time behavior of the weak solutions to this simplified equation is described with some detail.

References:

[1] E. Cortés, M. Escobedo, *On a Boltzmann equation for Compton scattering, from non relativistic electrons at low density*, e-print, arXiv:1808.04607v1 [math.AP], 2018.

[2] Y. B. Zel'dovich, E. V. Levich, and R. A. Syunyaev. *Stimulated Compton Interaction between Maxwellian Electrons and Spectrally Narrow Radiation*. Soviet Journal of Experimental and Theoretical Physics, 35:7330, 1972.

[3] Y. B. Zel'dovich and R. A. Syunyaev. *Shock Wave Structure in the Radiation Spectrum During Bose Condensation of Photons*. Soviet Journal of Experimental and Theoretical Physics, 35:81, 1972.

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