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Atomic collisions, inelastic indeed. HERVE BERCEGOL, GWENAEL FERRANDO, ROLAND LEHOUCQ, CEA — At the turn of the twentieth century, a hot controversy raged about the ability of Boltzmann's framework to take care of irreversibility. The so-called Loschmidt's paradox progressively faded with time during the last hundred years, due to the predictive efficiency of statistical mechanics. However, one detail at the origin of the controversy – the elasticity of atomic collisions – was not completely challenged. A semi-classical treatment of two atoms interacting with the vacuum zero-point field permits to predict a friction force acting against the rotation of the pair of atoms [Bercegol H. & Lehoucq R., *Phys. Rev. Lett.* **115**, 090402 (2015)]. By its form and its level, the calculated torque is a candidate as a physical cause for diffusion of energy and angular momentum, and consequently for entropy growth. It opens the way to a revision of the standard vision of irreversibility. This presentation will focus on two points. First we will discuss the recent result in a broader context of electromagnetic interactions during microscopic collisions. The predicted friction phenomenon can be compared to and distinguished from Collision-Induced Emission and other types of inelastic collisions. Second we will investigate the consequences of the friction torque on calculated trajectories of colliding atoms, quantifying the generation of dimers linked by dispersion forces.

Herve Bercegol
CEA

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