Nonequilibrium Calorimetry

F. Khodabandehlou[1], C. Maes[1], and K. Netocny[2]

[1] *Instituut voor Theoretische Fysica, KU Leuven, Leuven, Belgium*
[2] *Institute of Physics, Czech Academy of Sciences, Prague, Czech Republic*

We give an introduction to the possibility and usefulness of measuring excess heats for nonequilibrium steady states. That is illustrated in the case of driven lattice gases and active matter. Secondly, we present a nonequilibrium extension of the Nernst-Planck Postulate (Third Law of Thermodynamics). It has a different status from the other Laws: it is not a consequence of the general structure of statistical thermodynamics, it can fail, and it does not carry a straightforward dynamic or kinetic derivation when it does hold. In this talk we consider the latter question, by extending the Third Law to nonequilibrium jump processes. We give sufficient conditions in a Nonequilibrium Nernst Theorem, that the operationally defined excess heat vanishes at absolute zero, and from counter examples, we understand that those conditions are well on target. We give an example of a zero-temperature nonequilibrium transition where the heat capacity abruptly diverges as a function of the chemical potential.