Contribution ID: **14** Type: **Invited Talk**

A variational approach to nonequilibrium thermodynamics

Monday, 8 December 2025 13:30 (50 minutes)

I will discuss our recent work based on an information-theoretic variational principle for entropy production, closely related to the Donsker–Varadhan formula from large deviations theory. This principle can be applied to many types of systems (continuous and discrete, stochastic and deterministic, linear and nonlinear, classical and quantum), and it provides a unified way to approach many problems in nonequilibrium thermodynamics. As illustrative applications, I will discuss three topics: (1) decomposition of dissipation into conservative ("excess") and nonconservative ("housekeeping") parts, (2) derivation of thermodynamic uncertainty relations and thermodynamic speed limits, and (3) thermodynamic inference in many-body systems, such as nonequilibrium spin glasses. I will also mention some questions and open problems raised by this approach.

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