

SEMINARIO DE SISTEMAS DINÁMICOS DE SANTIAGO

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TITLE: Variational principles and equilibrium states for (semi)group actions.

ABSTRACT: The search for a thermodynamic formalism for dynamical systems aims to prove the existence of invariant probability measures which maximize the topological pressure, besides reporting on their statistical properties. A special feature of the classical thermodynamic formalism for Ruelle expanding maps, which becomes an important tool in many applications including applications to multifractal analysis or large deviations, is the upper-semicontinuity of the Kolmogorov-Sinai entropy map. Simple examples illustrate that this property breaks down in the absence of expansiveness. In this talk we will focus on the context of finitely generated group and semigroup actions, including the classical dynamical systems with one generator. As a first difficulty, in this wide context the topological notions of pressure are often fitted for the specific group action under consideration. In such generality, a second obstacle for a successful extension of the classical thermodynamic formalism lies in the fact that common invariant probabilities may not exist. Furthermore, even if common invariant measures exist (as in the case of amenable group actions) it seems not to exist a unified notion of measure-theoretical entropy which carries upper-semicontinuity as a fundamental device to describe the dynamics. Using methods from Convex Analysis, we will discuss how to associate for each generalized convex pressure function an upper semi-continuous entropy map (which, in the context of continuous transformations acting on a compact metric space and the classical topological pressure turns out to be the upper semi-continuous envelope of the Kolmogorov-Sinai metric entropy), how to establish abstract variational principles and prove that equilibrium states, possibly finitely additive, always exist. We also discuss a new insight on the thermodynamics of dynamical systems without a measure with maximal entropy, and applications for the existence of finitely additive ground states and equilibrium states for certain non-additive sequences of potentials arising from linear cocycles.

This is a joint work with A. Biś (University of Lodz), M. Carvalho (University of Porto) and M. Mendes (University of Porto).

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