

Banach manifold structure for the space of probability measures and applications to statistical mechanics

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Abstract

Based on the Pistone–Sempi manifold structure on the space of probability measures, with local model Orlicz spaces, we define a structure that renders entropy (as well as energy, number of particles, and momentum as constraints) differentiable. We then show that Lagrange multipliers with respect to this Banach manifold structure lead to standard equilibrium Gibbs measures. We shall also indicate how to extend the results to the case of local equilibrium.