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Mathematical Physics

On the Structure of Minimizers of **Causal Variational Principles in** the Non-Compact and Equivariant **Settings**

Yann Bernard, Felix Finster

(Submitted on 2 May 2012 (v1), last revised 4 Oct 2012 (this version, v3))

We derive the Euler-Lagrange equations for minimizers of causal variational principles in the non-compact setting with constraints, possibly prescribing symmetries. Considering first variations, we show that the minimizing measure is supported on the intersection of a hyperplane with a level set of a function which is homogeneous of degree two. Moreover, we perform second variations to obtain that the compact operator representing the quadratic part of the action is positive semi-definite. The key ingredient for the proof is a subtle adaptation of the Lagrange multiplier method to variational principles on convex sets.

Comments: 24 pages, LaTeX, 2 figures, minor corrections and improvements

Subjects: Mathematical Physics (math-ph); Functional Analysis

(math.FA)

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