Mathematical Physics

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

Yann Bernard, Felix Finster

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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.

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