In defence of naivete: The conceptual status of Lagrangian quantum field theory

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Abstract

I analyse the conceptual and mathematical foundations of
Lagrangian quantum field theory (that is, the "naive" quantum field theory used in mainstream physics, as opposed to algebraic quantum field theory). The objective is to see whether Lagrangian quantum field theory has a sufficiently firm conceptual and mathematical basis to be a legitimate object of foundational study, or whether it is too ill-defined. The analysis covers renormalisation and infinities, inequivalent representations, and the concept of localised states; the conclusion is that Lagrangian QFT (at least as described here) is a perfectly respectable physical theory, albeit somewhat different in certain respects from most of those studied in foundational work.

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