Abstract

Nonperturbative QED on the Hopf Bundle †

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Abstract: We consider the Dirac equation and Maxwell's electrodynamics in $\mathbb{R} \times S^3$ spacetime, where a three-dimensional sphere is the Hopf bundle $S^3 \to S^2$. The method of nonperturbative quantization of interacting Dirac and Maxwell fields is suggested. The corresponding operator equations and the infinite set of the Schwinger–Dyson equations for Green's functions is written down. To illustrate the suggested scheme of nonperturbative quantization, we write a simplified set of equations describing some physical situation. Additionally, we discuss the properties of quantum states and operators of interacting fields.

Keywords: Dirac equation; Maxwell's electrodynamics; Hopf bundle; nonperturbative quantization

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