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Precanonical quantization and the Schrödinger wave functional revisited. (English)

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Summary: We address the issue of the relation between the canonical functional Schrödinger representation in quantum field theory and the approach of precanonical field quantization proposed by the author, which requires neither a distinguished time variable nor infinite-dimensional spaces of field configurations. We argue that the standard functional derivative Schrödinger equation can be derived from the precanonical Dirac-like covariant generalization of the Schrödinger equation under the formal limiting transition $\gamma^0 \varkappa \to \delta(0)$, where the constant $\varkappa$ naturally appears within precanonical quantization as the inverse of a small "elementary volume" of space. We obtain a formal explicit expression of the Schrödinger wave functional as a continuous product of the Dirac algebra valued precanonical wave functions, which are defined on the finite-dimensional covariant configuration space of the field variables and space-time variables.

MSC:

81T70 Quantization in field theory; cohomological methods
81S05 Commutation relations and statistics as related to quantum mechanics (general)
81S10 Geometry and quantization, symplectic methods

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