

# Nonlinear Schrödinger equations from prequantum classical field theory

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We derive some important features of the standard quantum mechanics from a certain classical-like model – prequantum classical statistical field theory, PCSFT [1], [2]. In this approach correspondence between classical and quantum quantities is established through an asymptotic expansion which is based on the Taylor formula for functionals of classical fields. PCSFT induces not only linear Schrödinger’s equation, but also its *nonlinear generalizations*. This coupling with “nonlinear wave mechanics” is used to evaluate the small parameter of PCSFT which appears in the asymptotic expansion. We also consider general systems of Hamilton equations on the infinite dimensional phase space. In our model such a phase space is interpreted as the space of classical fields.

## References

- [1] Khrennikov, A. Yu. A pre-quantum classical statistical model with infinite-dimensional phase space. *J. Phys. A: Math. Gen.*, **38** (9051-9073), 2005.
- [2] Khrennikov, A. Yu. Linear and nonlinear analogues of the Schrödinger equation in the contextual approach to quantum mechanics. *Dokl. Akad. Nauk*, **404** (33–36), (2005); *Doklady Mathematics*, **72** (791-794), 2005.