

**QUANTUM FIELD THEORY AND ITS
MACROSCOPIC MANIFESTATIONS BY
MASSIMO BLASONE, PETR JIZBA,
GIUSEPPE VITIELLO**

Quantum Field Theory and its
Macroscopic Manifestations

Boson Condensation, Ordered Patterns
and Topological Defects

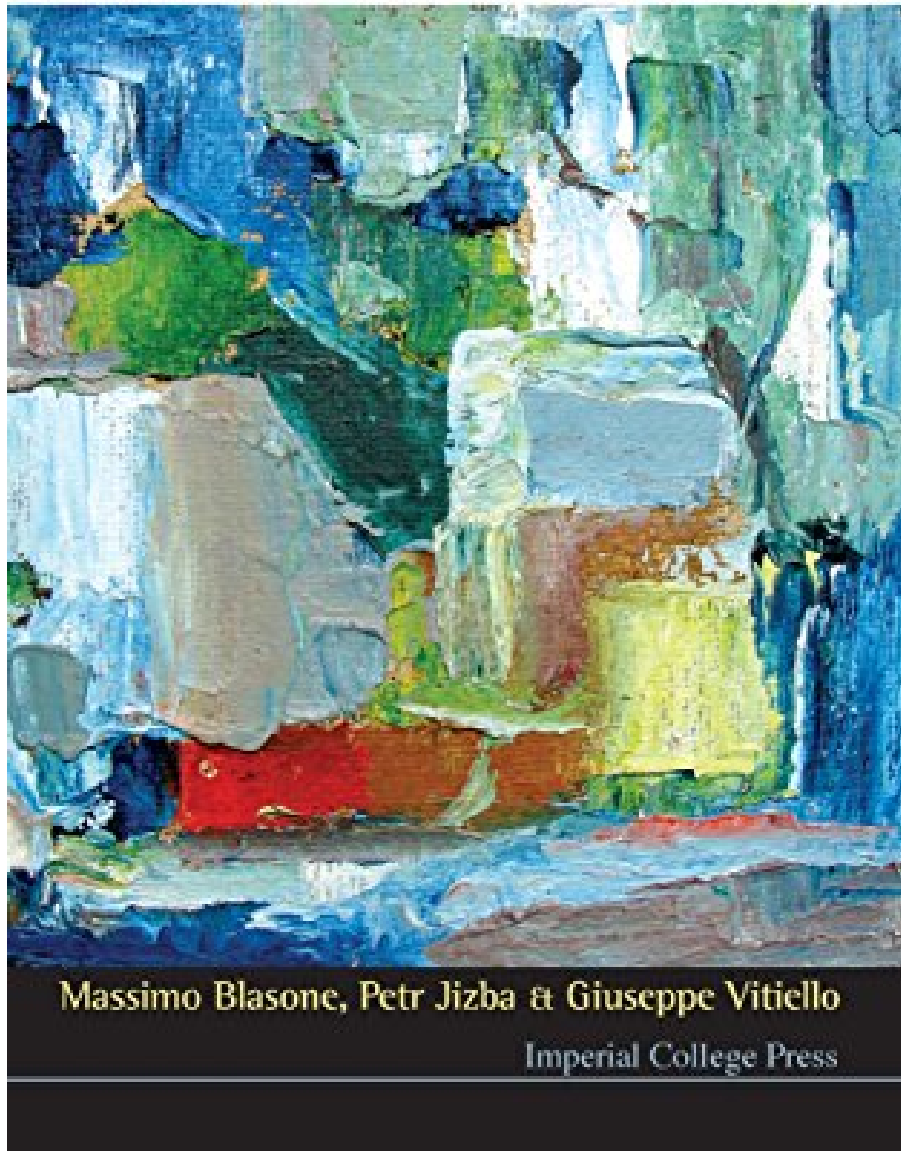


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Imperial College Press

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Review

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Quantum dynamics underlies macroscopic systems exhibiting some kind of ordering, such as superconductors, ferromagnets and crystals. Even large scale structures in the Universe and ordering in biological systems appear to be the manifestation of microscopic dynamics ruling their elementary components. The scope of this book is to answer questions such as: how it happens that the mesoscopic/macroscopic scale and stability characterizing those systems are dynamically generated out of the microscopic scale of fluctuating quantum components; how quantum particles coexist and interact with classically behaving macroscopic objects, e.g. vortices, magnetic domains and other topological defects. The quantum origin of topological defects and their interaction with quanta is a crucial issue for the understanding of symmetry breaking phase transitions and structure formation in a wide range of systems from condensed matter to cosmology. Deliberately not discussing other important problems, primarily renormalization problems, this book provides answers to such questions in a unitary, self-consistent physical and mathematical framework, which makes it unique in the panorama of existing texts on a similar subject. Crystals, ferromagnets and superconductors appear to be macroscopic quantum systems, i.e. their macroscopic properties cannot be explained without recourse to the underlying quantum dynamics. Recognizing that quantum field dynamics is not confined to the microscopic world is one of the achievements of this book, also marking its difference from other texts. The combined use of algebraic methods, and operator and functional formalism constitutes another distinctive, valuable feature.

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