Topics in Contemporary Mathematical Physics

Kai S Lam

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This new (second) edition contains a general treatment of *quantum field theory* (QFT) in a simple scalar field setting in addition to the modern material on the applications of *differential geometry and topology, group theory, and the theory of linear operators* to physics found in the first edition. All these are introduced without assuming more background on the part of the reader than a good foundation in undergraduate (junior) level mathematical physics. The new material entirely focuses on an introduction to *quantum field theory*, emphasizing the *Feynman path (functional integral)* approach to QFT and the *renormalization group*. With respect to the latter, the focus is on an introduction of its application to *critical phenomena* in statistical physics, following the outgrowth of the *Callan–Symanzik equation* originally developed in the context of high energy physics, and the seminal contributions of Kenneth Wilson. One of the overriding aims of the new material is also to draw students' attention to the deep connections between high energy physics and statistical mechanics.

The unavoidable technical aspects are explained with a minimum of prerequisite material and jargon, and conceptual understanding is always given prominence before mastery of technical details, but the importance of the latter is never underestimated. Derivational details and motivational discussions are provided in abundance in order to ensure continuity of reading, and to avoid trying the readers' patience.

Readership: Upper level undergraduates, graduate students, lecturers and researchers in mathematical and theoretical physics.

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