

1. Record Nr.	UNINA9910454096703321
Titolo	Analytic aspects of quantum fields [[electronic resource] /] / A.A. Bytsenko ... [et al.]
Pubbl/distr/stampa	[River Edge] New Jersey, : World Scientific, c2003
ISBN	1-281-92820-8 9786611928209 981-277-550-1
Descrizione fisica	1 online resource (370 p.)
Altri autori (Persone)	BytsenkoAndrei A
Disciplina	530.143
Soggetti	Quantum field theory Physics Electronic books.
Lingua di pubblicazione	Inglese
Formato	Materiale a stampa
Livello bibliografico	Monografia
Note generali	Description based upon print version of record.
Nota di bibliografia	Includes bibliographical references (p. 327-339) and index.
Nota di contenuto	Contents; Preface; 1 Survey of Path Integral Quantization and Regularization Techniques; 1.1 Path Integral and Regularization Techniques for Functional; 1.2 Schwinger-Like Regularizations and Heat-Kernel Expansion; 1.3 Logarithmic Terms in the Heat-Kernel Expansion; 1.4 One-Loop Renormalization Group Equations; 1.5 Static Spacetimes: Thermodynamic Effects; 1.5.1 Static and ultrastatic spacetimes; 1.5.2 Finite-temperature effects; 1.5.3 The free energy; 1.5.4 The thermodynamic potential; 1.5.5 Regularization of the vacuum energy; 1.5.6 A generalized vacuum energy formula 2 The Zeta-Function Regularization Method 2.1 Survey of the Chapter, Notation and Conventions; 2.1.1 Feasibility of physical interpretation via Wick rotation; 2.2 Heat-Kernel Expansion and Coefficients; 2.2.1 The heat-kernel expansion on compact manifolds; 2.2.2 The self-adjoint extension; 2.2.3 Existence of the (differentiated) heat-kernel expansion; 2.2.4 The heat-kernel coefficients; 2.3 Local and Global Spectral Zeta Functions on Compact Manifolds; 2.3.1 Weyl's asymptotic formulae; 2.3.2 Spectral zeta functions; 2.4 Effective Action, Effective Lagrangian and Green Functions 2.4.1 Comparison with the point-splitting regularization procedure

4.2 Green functions and zeta functions; 2.4.3 Differential calculus of the heat kernel and local zeta functions; 2.5 Noncompact Manifolds and Manifolds with a Boundary; 2.6 The Stress-Energy Tensor and Field-Fluctuation Regularization; 2.6.1 The stress-energy tensor; 2.6.2 Zeta-function regularization of the stress-energy tensor and the field fluctuation; 2.6.3 The regularized stress tensor and its properties; 2.6.4 On the physical interpretation; 3 Generalized Spectra and Spectral Functions on Non-commutative Spaces  
 3.1 Extended Chowla-Selberg Formulae and Arbitrary Spectral Forms  
 3.2 Barnes and Related Zeta Functions; 3.2.1 The two-dimensional case; 3.2.2 The D-dimensional case; 3.3 Spectral Zeta Functions for Scalar and Vector Fields on a Spacetime with a Non-commutative Toroidal Part; 3.3.1 Poles of the zeta function; 3.3.2 Explicit analytic continuation of  $\zeta(s)$ ; 3.4 Applications to Quantum Field Theory in Non-commutative Space; 3.4.1 Finite-temperature partition function; 3.4.2 The spectral zeta function and the regularized vacuum energy; 3.4.3 The regularized vacuum energy  
 3.4.4 High-temperature expansion  
 4 Spectral Functions of Laplace Operator on Locally Symmetric Spaces; 4.1 Locally Symmetric Spaces of Rank One; 4.2 The Spectral Zeta Function; 4.3 Asymptotics of the Heat Kernel; 4.4 Product of Einstein Manifolds; 4.4.1 The Kronecker sum of Laplace operators; 4.4.2 The Selberg zeta function. Factorization formula; 4.4.3 Meromorphic continuation; 4.5 Real Hyperbolic Manifolds; 4.5.1 Laplacian on forms; 4.5.2 Simple complex Lie group; 4.5.3 An example of functional determinant evaluation; 4.5.4 Scalar fields in spacetime with spatial section of the form  $\mathbb{H}^3$   
 5 Spinor Fields

---

Sommario/riassunto

One of the aims of this book is to explain in a basic manner the seemingly difficult issues of mathematical structure using some specific examples as a guide. In each of the cases considered, a comprehensible physical problem is approached, to which the corresponding mathematical scheme is applied, its usefulness being duly demonstrated. The authors try to fill the gap that always exists between the physics of quantum field theories and the mathematical methods best suited for its formulation, which are increasingly demanding on the mathematical ability of the physicist.

*Contents:*

---