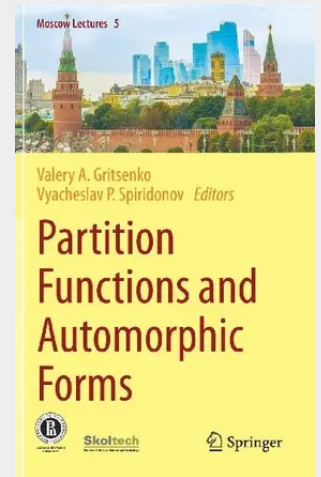


## Partition Functions and Automorphic Forms

This book offers an introduction to the research in several recently discovered and actively developing mathematical and mathematical physics areas. It focuses on: 1) Feynman integrals and modular functions, 2) hyperbolic and Lorentzian Kac-Moody algebras, related automorphic forms and applications to quantum gravity, 3) superconformal indices and elliptic hypergeometric integrals, related instanton partition functions, 4) moonshine, its arithmetic aspects, Jacobi forms, elliptic genus, and string theory, and 5) theory and applications of the elliptic Painleve equation, and aspects of Painleve equations in quantum field theories. All the topics covered are related to various partition functions emerging in different supersymmetric and ordinary quantum field theories in curved space-times of different ( $d=2,3,\dots,6$ ) dimensions. Presenting multidisciplinary methods (localization, Borchers products, theory of special functions, Cremona maps, etc) for treating a range of partition functions, the book is intended for graduate students and young postdocs interested in the interaction between quantum field theory and mathematics related to automorphic forms, representation theory, number theory and geometry, and mirror symmetry.

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