

Discover the Intriguing World of Higher Dimensional Combinatorial Maps and Quantum Gravity with Springer Theses

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What are Higher Dimensional Combinatorial Maps?

Higher Dimensional Combinatorial Maps (HDCMs) are mathematical objects used to model the connectivity and structure of complex systems in higher dimensions. These maps capture the relationships between different elements and allow researchers to study the properties and behavior of these systems.

Imagine taking a regular map of your city and extending it to multiple dimensions. Instead of just representing the streets and landmarks in a two-dimensional plane, HDCMs can represent the connectivity of a city or any other system in higher dimensions, providing a more comprehensive understanding of its structure and relationships.

Colored Discrete Spaces: Higher Dimensional Combinatorial Maps and Quantum Gravity



(Springer Theses)

by Alexey S. Kurlov (1st ed. 2018 Edition, Kindle Edition)

★★★★★ 5 out of 5

Language : English
File size : 42740 KB
Text-to-Speech : Enabled
Screen Reader : Supported
Enhanced typesetting : Enabled
Print length : 349 pages



Understanding Quantum Gravity

Quantum Gravity is a field of study in theoretical physics that aims to unify Einstein's theory of General Relativity, which describes gravity at large scales, with quantum mechanics, which governs the behavior of matter at the microscopic level. The ultimate goal of Quantum Gravity is to provide a consistent description of gravity at all scales, including the extremely small scales where quantum effects dominate.

Quantum Gravity is a challenging problem because it requires reconciling two vastly different frameworks: the continuous and smooth spacetime of General Relativity and the discrete and probabilistic nature of quantum mechanics. Many theories and approaches have been proposed to tackle this problem, ranging from string theory to loop quantum gravity.

Springer Theses: Exploring the Frontier of Research

Springer Theses is a prestigious series of books published by Springer, one of the largest academic publishing companies in the world. These books present outstanding research and doctoral theses across various scientific disciplines.

The series aims to showcase groundbreaking research and highlight the work of promising young researchers.

The Springer Theses book on Higher Dimensional Combinatorial Maps and Quantum Gravity explores the intersection of these two fascinating fields. Authored by a brilliant young researcher, this thesis delves into the mathematical foundations of HDCMs and their application to the study of Quantum Gravity.

Key Contributions and Findings

Throughout the thesis, the author presents novel techniques and approaches for analyzing and visualizing HDCMs, shedding light on their hidden structures and topological features. By applying these tools to the study of Quantum Gravity, the author uncovers new insights into the nature of spacetime and the behavior of matter at the quantum level.

One of the key findings of this research is the discovery of unexpected connections between the geometry of HDCMs and the emergence of gravity. By examining the properties of these higher-dimensional maps, the author identifies geometric patterns that correspond to the gravitational field and proposes a new framework for understanding the intertwining of geometry and quantum mechanics.

The Implications for Future Research

The Springer Theses book on Higher Dimensional Combinatorial Maps and Quantum Gravity opens up exciting avenues for further research and exploration. The findings and techniques presented in this thesis pave the way for new developments in both combinatorial mathematics and quantum gravity.

Researchers can build upon this work to investigate more complex and realistic systems, such as black holes or the early universe, and deepen our understanding of the fundamental nature of reality. Furthermore, the techniques developed in this thesis provide powerful tools for studying other complex systems beyond Quantum Gravity, ranging from network theory to computational biology.

In

The world of Higher Dimensional Combinatorial Maps and Quantum Gravity is a captivating and intellectually stimulating domain. The Springer Theses book on this topic offers a unique and comprehensive exploration of these interconnected fields, shedding light on the intricate relationship between mathematical structures and the fundamental forces that shape our universe.

If you are passionate about delving into the mysteries of the cosmos, understanding the mathematics behind our reality, and exploring cutting-edge research, the Springer Theses book on Higher Dimensional Combinatorial Maps and Quantum Gravity is a must-read for you. Unleash your curiosity, embark on a journey into higher dimensions, and witness the future of scientific discovery.



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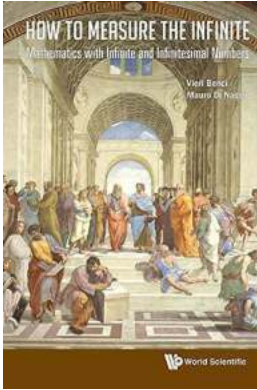
This book provides a number of combinatorial tools that allow a systematic study of very general discrete spaces involved in the context of discrete quantum gravity. In any dimension D , we can discretize Euclidean gravity in the absence of matter over random discrete spaces obtained by gluing families of polytopes together in all possible ways. These spaces are then classified according to their curvature. In $D=2$, it results in a theory of random discrete spheres, which converge in the continuum limit towards the Brownian sphere, a random fractal space interpreted as a quantum random space-time. In this limit, the continuous Liouville theory of $D=2$ quantum gravity is recovered.

Previous results in higher dimension regarded triangulations, converging towards a continuum random tree, or gluings of simple building blocks of small sizes, for which multi-trace matrix model results are recovered in any even dimension. In this book, the author develops a bijection with stacked two-dimensional discrete surfaces for the most general colored building blocks, and details how it can be used to classify colored discrete spaces according to their curvature. The way in which this combinatorial problem arises in discrete quantum gravity and random tensor models is discussed in detail.



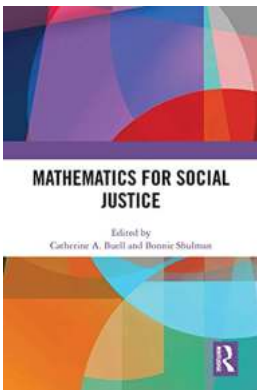
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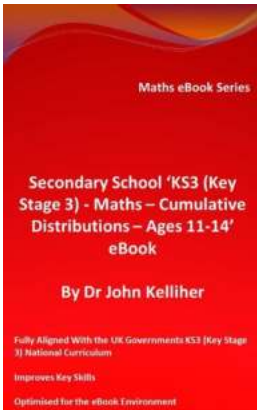
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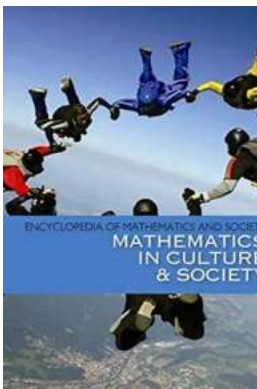
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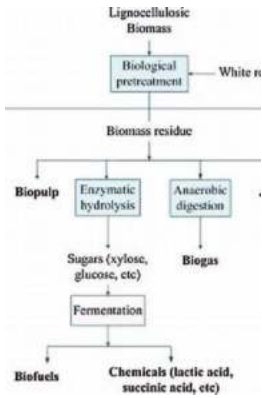
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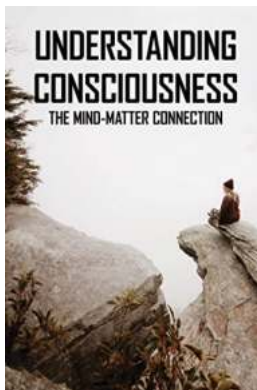
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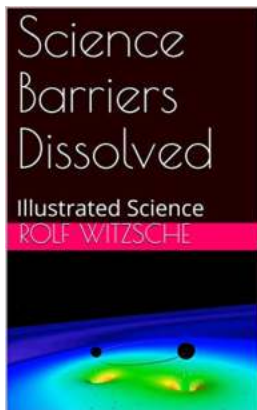
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