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# LOW DIMENSIONAL TOPOLOGY

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# Low Dimensional Topology

**Masanori Morishita, Hiroaki  
Nakamura, Jun Ueki**



## **Low Dimensional Topology:**

Selected Applications of Geometry to Low-Dimensional Topology Michael H. Freedman, Feng Luo, 1990 Based on lectures presented at Pennsylvania State University in February 1987 this work begins with the notions of manifold and smooth structures and the Gauss Bonnet theorem and proceeds to the topology and geometry of foliated 3 manifolds It also explains why four dimensional space has special attributes      New Ideas In Low Dimensional Topology Vassily Olegovich

Manturov, Louis H Kauffman, 2015-01-27 This book consists of a selection of articles devoted to new ideas and developments in low dimensional topology Low dimensions refer to dimensions three and four for the topology of manifolds and their submanifolds Thus we have papers related to both manifolds and to knotted submanifolds of dimension one in three classical knot theory and two in four surfaces in four dimensional spaces Some of the work involves virtual knot theory where the knots are abstractions of classical knots but can be represented by knots embedded in surfaces This leads both to new interactions with classical topology and to new interactions with essential combinatorics      *Low Dimensional Topology* American Mathematical Society, 1983 Derived from a special session on Low Dimensional Topology organized and conducted by Dr Lomonaco at the American Mathematical Society meeting held in San Francisco California January 7 11 1981

Topics in low-dimensional topology : in honor of Steve Armentrout : proceedings of the Conference on Low-Dimensional Topology Augustin Banyaga, 1999      *Low Dimensional Topology* Roger Fenn, 1985-07-25 In this volume which is dedicated to H Seifert are papers based on talks given at the Isle of Thorns conference on low dimensional topology held in 1982

**Low-dimensional Topology** Klaus Johannson, 1994 A collection of papers taken from a conference on low dimensional topology held at the University of Tennessee in 1992 Special emphasis is given to hyperbolic and combinatorial structures minimal surface theory negatively curved groups and group actions on R trees      **Low-Dimensional Topology and**

**Quantum Field Theory** Hugh Osborn, 2013-11-11 The motivations goals and general culture of theoretical physics and mathematics are different Most practitioners of either discipline have no necessity for most of the time to keep abreast of the latest developments in the other However on occasion newly developed mathematical concepts become relevant in theoretical physics and the less rigorous theoretical physics framework may prove valuable in understanding and suggesting new theorems and approaches in pure mathematics Such interdisciplinary successes invariably cause much rejoicing as over a prodigal son returned In recent years the framework provided by quantum field theory and functional integrals developed over half a century in theoretical physics have proved a fertile soil for developments in low dimensional topology and especially knot theory Given this background it was particularly pleasing that NATO was able to generously support an Advanced Research Workshop to be held in Cambridge England from 6th to 12th September 1992 with the title Low Dimensional Topology and Quantum Field Theory Although independently organised this overlapped as far as some speakers were concerned with a longer term programme with the same title organised by Professor M Green Professor E Corrigan and

Dr R Lickorish The contents of this proceedings of the workshop demonstrate the breadth of topics now of interest on the interface between theoretical physics and mathematics as well as the sophistication of the mathematical tools required in current theoretical physics

**Differential and Low-Dimensional Topology** András Juhász, 2023-04-20 The new student in differential and low dimensional topology is faced with a bewildering array of tools and loosely connected theories This short book presents the essential parts of each enabling the reader to become literate in the field and begin research as quickly as possible The only prerequisite assumed is an undergraduate algebraic topology course The first half of the text reviews basic notions of differential topology and culminates with the classification of exotic seven spheres It then dives into dimension three and knot theory There then follows an introduction to Heegaard Floer homology a powerful collection of modern invariants of three and four manifolds and of knots that has not before appeared in an introductory textbook The book concludes with a glimpse of four manifold theory Students will find it an exhilarating and authoritative guide to a broad swathe of the most important topics in modern topology

**Intelligence of Low Dimensional Topology 2006** J. Scott Carter, 2007 This volume gathers the contributions from the international conference Intelligence of Low Dimensional Topology 2006 which took place in Hiroshima in 2006 The aim of this volume is to promote research in low dimensional topology with the focus on knot theory and related topics The papers include comprehensive reviews and some latest results

**Invariants And Pictures: Low-dimensional Topology And Combinatorial Group Theory** Vassily Olegovich Manturov, Denis Fedoseev, Seongjeong Kim, Igor Nikonov, 2020-04-22 This book contains an in depth overview of the current state of the recently emerged and rapidly growing theory of  $G_n$  groups picture valued invariants and braids for arbitrary manifolds Equivalence relations arising in low dimensional topology and combinatorial group theory inevitably lead to the study of invariants and good invariants should be strong and apparent An interesting case of such invariants is picture valued invariants whose values are not algebraic objects but geometrical constructions like graphs or polyhedra In 2015 V O Manturov defined a two parametric family of groups  $G_n$  and formulated the following principle if dynamical systems describing a motion of  $n$  particles possess a nice codimension 1 property governed by exactly  $k$  particles then these dynamical systems possess topological invariants valued in  $G_n$  The book is devoted to various realisations and generalisations of this principle in the broad sense The groups  $G_n$  have many epimorphisms onto free products of cyclic groups hence invariants constructed from them are powerful enough and easy to compare However this construction does not work when we try to deal with points on a 2 surface since there may be infinitely many geodesics passing through two points That leads to the notion of another family of groups  $n_k$  which give rise to braids on arbitrary manifolds yielding invariants of arbitrary manifolds

Low Dimensional Topology Benghe Li, Shicheng Wang, Xuezhi Zhao, 2003

**Intelligence of Low-dimensional Topology**, 2010 **Aspects of Low Dimensional Manifolds** Yukio Matsumoto, Shigeyuki Morita, 1992 This volume contains ten original papers written by leading experts in various areas of

low dimensional topology The topics covered here are among those showing the most rapid progress in topology today knots and links three dimensional hyperbolic geometry conformally flat structures on three manifolds Floer homology and the geometry and topology of four manifolds Offering both original results and up to date survey papers Aspects of Low Dimensional Manifolds will interest mathematicians physicists graduate students and others seeking a good introduction to the field Low Dimensional Topology Tomasz Mrowka, Peter Steven Ozsváth, 2009-01-01 **Low Dimensional Topology**

Tomasz Mrowka, Peter Steven Ozsváth, 2009 Low dimensional topology has long been a fertile area for the interaction of many different disciplines of mathematics including differential geometry hyperbolic geometry combinatorics representation theory global analysis classical mechanics and theoretical physics The Park City Mathematics Institute summer school in 2006 explored in depth the most exciting recent aspects of this interaction aimed at a broad audience of both graduate students and researchers The present volume is based on lectures presented at the summer school on low dimensional topology These notes give fresh concise and high level introductions to these developments often with new arguments not found elsewhere The volume will be of use both to graduate students seeking to enter the field of low dimensional topology and to senior researchers wishing to keep up with current developments The volume begins with notes based on a special lecture by John Milnor about the history of the topology of manifolds It also contains notes from lectures by Cameron Gordon on the basics of three manifold topology and surgery problems Mikhail Khovanov on his homological invariants for knots John Etnyre on contact geometry Ron Fintushel and Ron Stern on constructions of exotic four manifolds David Gabai on the hyperbolic geometry and the ending lamination theorem Zoltan Szabo on Heegaard Floer homology for knots and three manifolds and John Morgan on Hamilton's and Perelman's work on Ricci flow and geometrization **Low Dimensional**

**Topology and Number Theory** Masanori Morishita, Hiroaki Nakamura, Jun Ueki, 2025-03-02 This book is the result of research initiatives formed during the workshop Low Dimensional Topology and Number Theory XIII at Kyushu University in 2022 It is also dedicated to the memory of Professor Toshie Takata who has been a main figure of the session chairs for the series of annual workshops since 2009 The activity was aimed at understanding and deepening recent developments of lively and fruitful interactions between low dimensional topology and number theory over the past decades In this volume of proceedings the reader will find research papers as well as survey articles including open problems at the interface between classical and quantum topology and algebraic and analytic number theory written by leading experts and active researchers in the respective fields Topics include among others the strong slope conjecture Kashiwara-Vergne Lie algebra braids and fibered double branched covers of 3-manifolds Temperley-Lieb Jones category and conformal blocks WRT invariants and false theta functions the colored Jones polynomial of the figure eight knot potential functions and  $A$ -polynomials  $l$ -adic Galois polylogarithms Dijkgraaf-Witten invariants in Bloch groups analogies between knots and primes in arithmetic topology normalized Jones polynomials for rational links Iwasawa main conjecture Weber's class number problem The book provides a

valuable resource for researchers and graduate students interested in topics related to both low dimensional topology and number theory

**Singularities and Low Dimensional Topology** Andras Stipsicz, Javier Fernández de Bobadilla, Marco Marengon, András Némethi, 2024-09-11 The special semester Singularities and low dimensional topology in the Spring of 2023 at the Erdős Center Budapest brought together algebraic geometers and topologists to discuss and explore the strong connection between surface singularities and topological properties of three and four dimensional manifolds The semester featured a Winter School with four lecture series and several focused weeks This volume contains the notes of the lecture series of the Winter School and some of the lecture notes from the focused weeks Topics covered in this collection range from algebraic geometry of complex curves lattice homology of curve and surface singularities to novel results in smooth four dimensional topology and grid homology and to Seiberg Witten homotopy theory and spacification of knot invariants Some of these topics are already well documented in the literature and the lectures aim to provide a new perspective and fresh connections Other topics are rather new and have been covered only in research papers We hope that this volume will be useful not only for advanced graduate students and early stage researchers but also for the more experienced geometers and topologists who want to be informed about the latest developments in the field

**Low-Dimensional Topology** R. Brown, T. L. Thickstun, 1982-05-20 This volume consists of the proceedings of a conference held at the University College of North Wales Bangor in July of 1979 It assembles research papers which reflect diverse currents in low dimensional topology The topology of 3 manifolds hyperbolic geometry and knot theory emerge as major themes The inclusion of surveys of work in these areas should make the book very useful to students as well as researchers

**Singularities and Their Interaction with Geometry and Low Dimensional Topology** Javier Fernández de Bobadilla, Tamás László, András Stipsicz, 2021-05-27 The book is a collection of surveys and original research articles concentrating on new perspectives and research directions at the crossroads of algebraic geometry topology and singularity theory The papers written by leading researchers working on various topics of the above fields are the outcome of the Némethi60 Geometry and Topology of Singularities conference held at the Alfréd Rényi Institute of Mathematics in Budapest from May 27 to 31 2019 Both the conference and this resulting volume are in honor of Professor András Némethi on the occasion of his 60th birthday whose work plays a decisive and influential role in the interactions between the above fields The book should serve as a valuable resource for graduate students and researchers to deepen the new perspectives methods and connections between geometry and topology regarding singularities

**Geometry and Topology of Low Dimensional Systems** T. R. Govindarajan, Pichai Ramadevi, 2024-09-16 This book introduces the field of topology a branch of mathematics that explores the properties of geometric space with a focus on low dimensional systems The authors discuss applications in various areas of physics The first chapters of the book cover the formal aspects of topology including classes homotopic groups metric spaces and Riemannian and pseudo Riemannian geometry These topics are essential for understanding the theoretical concepts and

notations used in the next chapters of the book The applications encompass defects in crystalline structures space topology spin statistics Braid group Chern Simons field theory and 3D gravity among others This self contained book provides all the necessary additional material for both physics and mathematics students The presentation is enriched with examples and exercises making it accessible for readers to grasp the concepts with ease The authors adopt a pedagogical approach posing many unsolved questions in simple situations that can serve as challenging projects for students Suitable for a one semester postgraduate level course this text is ideal for teaching purposes

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### Low Dimensional Topology Introduction

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