



# Invariants of Homology 3-Spheres

*By Nikolai Saveliev*

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## **Invariants of Homology 3-Spheres** By Nikolai Saveliev

The book gives a systematic exposition of the diverse ideas and methods in the area, from algebraic topology of manifolds to invariants arising from quantum field theories. The main topics covered include: constructions and classification of homology 3-spheres, Rokhlin invariant, Casson invariant and its extensions, and Floer homology and gauge-theoretical invariants of homology cobordism. Many of the topics covered in the book appear in monograph form for the first time. The book gives a rather broad overview of ideas and methods and provides a comprehensive bibliography. The text will be a valuable source for both the graduate student and researcher in mathematics and theoretical physics.

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## **Invariants of Homology 3-Spheres** By Nikolai Saveliev Bibliography

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## Editorial Review

### Review

From the reviews:

"The book can be considered as a fundamental monograph on invariants of homology 3-spheres. Let us mention that while the topic may seem rather specialised, these investigations have proved to be extremely useful in the manifold topology... [...] Obviously, the book is designed for specialists in the field who will find there a practically complete survey of results and methods. On the other hand, it is written in such a clear style that I would like to recommend it strongly to postgraduate students starting to make themselves familiar with the field. The book will help them to learn basic notions and will gradually introduce them into contemporary research. [...]"

*European Mathematical Society Newsletter, Dec. 2004, p. 44*

"This book is an excellent survey on invariants of homology 3-spheres. [...] This book is both a valuable resource for experts and a good introduction for newcomers. The author has exercised judicious restraint in his selection of topics, and the result is a well-organized and well-written book that will appeal to anyone with an interest in low-dimensional topology. [...]"

*Hans U. Boden, Mathematical Reviews Clippings from Issue 2004c*

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"This book is an excellent survey on invariants of homology 3-spheres. ... This book is both a valuable resource for experts and a good introduction for newcomers. The author has exercised judicious restraint in his selection of topics, and the result is a well-organized and well-written book that will appeal to anyone with an interest in low-dimensional topology." (Hans U. Boden, Mathematical Reviews, 2004 c)

"As suggested by the title of the book, its main subject are invariants of integer and rational homology 3-spheres ... . The book is written in a style in the middle between the text book and a report or encyclopaedia. ... on little more than 200 pages the book presents a wealth of material which will make it useful for graduate students and researchers in mathematics and theoretical physics looking for information and orientation in a field of considerable interest in the last decades." (Bruno Zimmermann, Zentralblatt MATH, Vol. 998 (23), 2002)

### From the Back Cover

Homology 3-sphere is a closed 3-dimensional manifold whose homology equals that of the 3-sphere. These objects may look rather special but they have played an outstanding role in geometric topology for the past fifty years. The book gives a systematic exposition of diverse ideas and methods in the area, from algebraic topology of manifolds to invariants arising from quantum field theories. The main topics covered in the book are constructions and classification of homology 3-spheres, Rokhlin invariant, Casson invariant and its numerous extensions, including invariants of Walker and Lescop, Herald and Lin invariants of knots, and

equivariant Casson invariants, followed by Floer homology and gauge-theoretical invariants of homology cobordism. Many of the topics covered in the book appear in monograph form for the first time. The book gives a rather broad overview of ideas and methods and provides a comprehensive bibliography. It will be appealing to both graduate students and researchers in mathematics and theoretical physics.

## **Users Review**

### **From reader reviews:**

#### **Christy McCurry:**

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#### **Charles Howell:**

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