American Mathematical Society
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Series 2 • Volume 198
Advances in the Mathematical Sciences

On Dobrushin's Way. From Probability Theory to Statistical Physics

R. A. Minlos
Senya Shlosman
Yu. M. Suhov
Editors

American Mathematical Society

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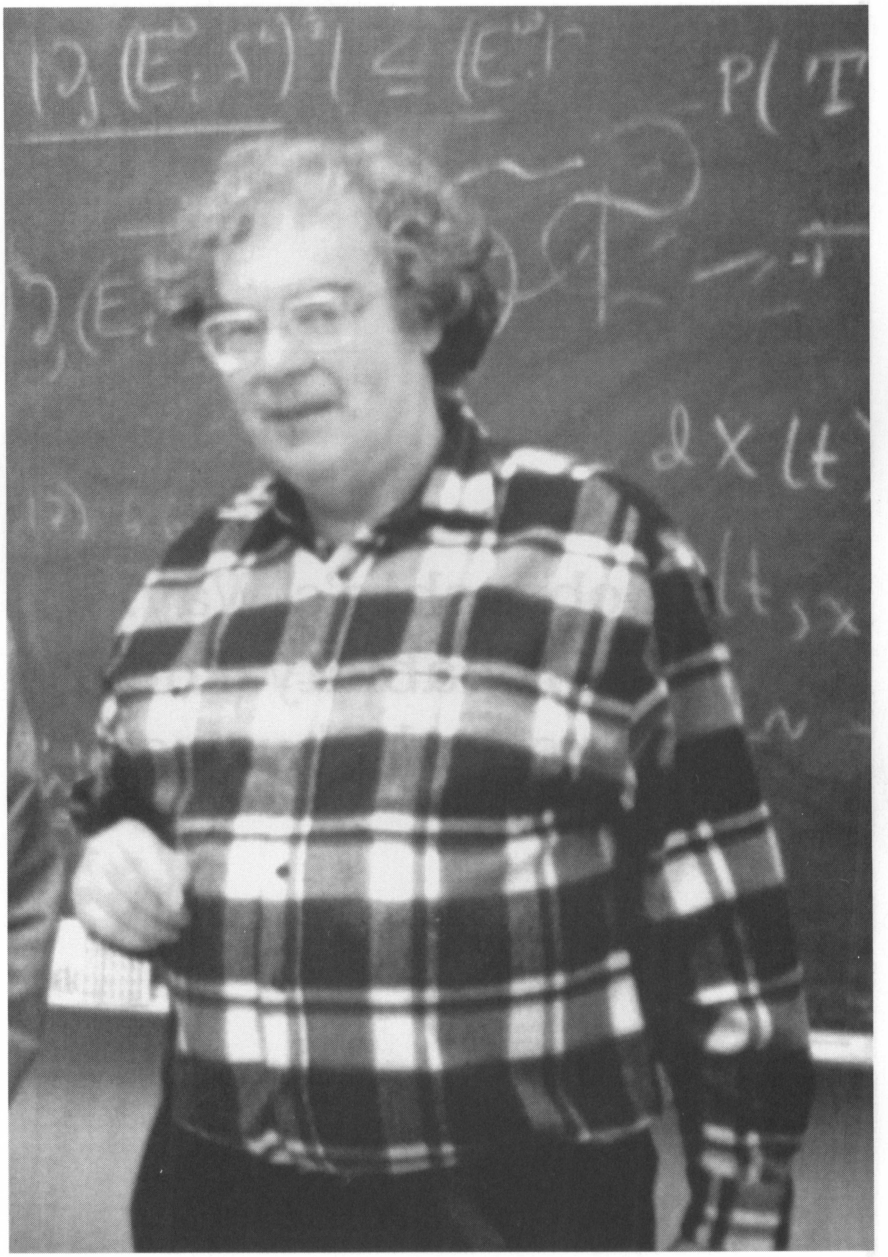

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Advances in the Mathematical Sciences — 47

On Dobrushin's Way. From Probability Theory to Statistical Physics

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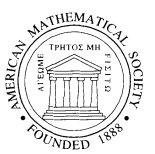

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V. I. ARNOLD
S. G. GINDIKIN
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ABSTRACT. The volume contains research articles in mathematical physics, especially in statistical mechanics, written by friends, collaborators, and students of Roland L'vovich Dobrushin (1929–1995). Also included are a short biography and some recollections about Dobrushin.

The book is useful for researchers and graduate students working in mathematical physics and Markov processes and fields.

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Foreword

1999 marks the 70th birthday anniversary of Roland Dobrushin—a brilliant mathematician and a remarkable person. Four years have already gone by since he passed away, but his memory is still very much alive and the feeling of irreparable loss only increases as the years go by.

R. Dobrushin worked in several branches of mathematics (probability theory, information theory), but his deepest influence was on mathematical physics. He was one of the founders of the rigorous study of statistical physics. In the early sixties, when R. Dobrushin began working in that direction, only a few people in the world were thinking along the same lines, whereas now there is a huge army of researchers in this field. The present collection of articles in mathematical physics is devoted to the memory of Roland Dobrushin. The authors participating in this collection knew Roland quite well; some were actually his collaborators.

The title of the volume, "On Dobrushin's Way" stresses the fact that the current development of mathematical physics is indeed evolving along the lines that Dobrushin foresaw, and also that the ideas and methods due to him are extensively used in this discipline.

In addition to research papers, this volume contains a short biography and some recollections about R. Dobrushin. The latter are organized in three sections: the first are recollections related to Dobrushin's social and political outlook, the second are personal reminiscences of his contemporaries, the third consists of recollections of his younger colleagues. We hope that from these short and somewhat disparate sketches the reader will be able to experience a bit of the charm of Roland's marvelous personality.

A detailed account of R. L. Dobrushin's research activities can be found in [**1**]–[**8**].

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A brief biography

R. L. Dobrushin was born on July 20th, 1929 in Leningrad. At the age of six he lost his father and moved to Moscow with his mother. Soon after the end of the war his mother also died, and he was brought up in a family of relatives.

R. L. Dobrushin, whose love for mathematics arose in his high school years, entered the Mechanics and Mathematics Department of Moscow University in 1947 and graduated from it in 1952. Beginning from his freshman year, R. L. Dobrushin participated in the optional student seminar headed by E. B. Dynkin, where he acquired his interest in probability theory as well as the very specific style of thinking characteristic of experts in that field. In subsequent years R. L. Dobrushin developed these qualities and attained an extraordinary depth in his "probabilistic" intuition. In his last years as an undergraduate, R. L. Dobrushin worked under A. N. Kolmogorov on certain problems in the theory of Markov processes and was recommended to graduate school by the latter. It should be noted that it was only as the result of great efforts and obstinacy that A. N. Kolmogorov succeeded to have him accepted in the graduate program, because in that period (the years of Stalin's governmental antisemitic policies) ethnic Jews were ordinarily banned even from doing undergraduate mathematics.

Upon completion of his graduate work in 1955, R. L. Dobrushin defended his *kandidat*'s thesis (PhD) on "The local limit theorem for Markov chains" and obtained a position at the chair of probability theory of the Mechanics and Mathematics Department of Moscow University, where he taught until 1967. It was approximately at this same time that R. L. Dobrushin began working in a new branch of science: information theory. The completion of his work in that direction was marked by his successful defense in 1961 of his *doktorskaya* dissertation (habilitation) on "Information theory and coding."

It should be noted that R. L. Dobrushin was always interested in "physics" in the broadest sense of this term, as the part of the real world that could only be described in the language of mathematics (say, the language of probability theory) and which would fill this language with new and meaningful content. And so, continuing to work in information theory, R. L. Dobrushin began his study of statistical physics, which was to become his main field of research until the end of his life.

In 1967 R. L. Dobrushin was invited to head the Laboratory of Coding Theory at the Institute of Information Transmission Problems (IITP) of the Russian Academy of Sciences and left the university, although he remained one of the heads of the statistics physics seminar at the Mathematics and Mechanics Department there. R. L. Dobrushin's pedagogical work also continued at the Physico-Technical Institute, where he lectured in information theory for many years.

In his laboratory at IITP R. L. Dobrushin brought together a remarkable group of mathematicians working actively in different areas of this science. Here, because of his taste for meaningful applications, he endeavored to interest the collaborators in applied problems. In this connection he always stressed that each specific applied problem should be included in a more general scientific context, and only then could it be entirely clarified. After his death, the laboratory that he had headed was renamed the "Dobrushin Mathematical Laboratory." This name reflects both Dobrushin's huge mathematical achievements and his outstanding capabilities as an organizer.

R. L. Dobrushin's mathematical talent was intimately connected to his rare pedagogical gift. His lectures and seminar reports were always carefully prepared and significant, they invariably gathered a large number of listeners. He had numerous pupils and collaborators, and it was always instructive to talk mathematics with him.

In 1995 R. L. Dobrushin was diagnosed with cancer, and his health noticeably deteriorated from day to day. But until the very last days he believed in his own recovery and continued to work with the same intensity. He died on November 12, 1995. The urn with his remains is buried at the Vostryakov cemetery in Moscow. For his family, his friends, collaborators, and colleagues his death was a harsh blow, felt strongly to this day.

This book is a tribute to his memory.

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