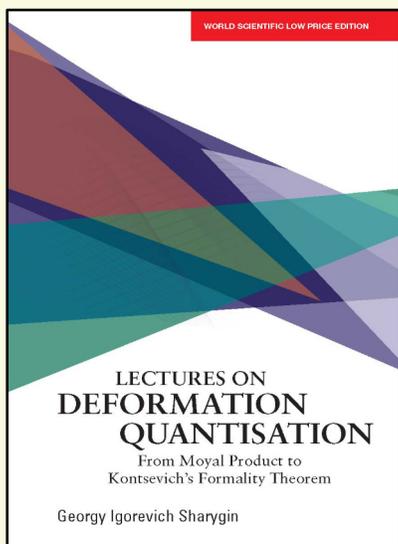


Lectures on Deformation Quantisation

From Moyal Product to Kontsevich's Formality Theorem



By **Georgy Igorevich Sharygin**
(Lomonosov Moscow State University, Russia)

ISBN	9798886131697
Extent	452pp
Binding	Paperback
Year	2026
Price	Rs. 1995

ABOUT THE BOOK

Principles of classical Hamiltonian mechanics say that the evolution of a dynamical system is determined by the Poisson bracket of observable functions with the given Hamiltonian function of the system. In Quantum Mechanics, these principles are modified so that the algebra of observable functions should be replaced by a noncommutative algebra of operators and the Poisson bracket by their commutator so that the canonical commutation relations hold. Thus, working with quantum systems, we must determine the "quantisation" of our observables, i.e. to choose a noncommutative algebra whose elements would play the role of the observables. With some modifications, this question is the main content of the Deformation Quantisation problem formulated in 1978 by Flato and others.

This book is based on the course that the author taught in the Fall semester of 2019 at Peking University. The main purpose of that course and of this book is to acquaint the reader with the vast scope of ideas related to the Deformation Quantisation of Poisson manifolds. The book begins with Quantum Mechanics and Moyal product formula and covers the three main constructions that solve the Deformation Quantisation problem: Lecomte and de Wilde deformation of symplectic manifolds, Fedosov's Quantisation theory and Kontsevich's formality theorem. In the appendices, the Tamarkin's proof of formality theorem is outlined.

The book is written in a reader-friendly manner and is as self-contained as possible. It includes several sets of problems and exercises that will help the reader to master the material.

READERSHIP

Postgraduate and advanced undergraduate students of Mathematics and Physics, researchers and scholars in the fields of Quantum Physics and Mathematics, aiming at learning the basics of deformation quantisation theory, or to teach a course on this subject. Researchers in the fields of Applied Physics and Mathematics.

CONTENTS

- Preface
- Introduction
- General Principles of Classical and Quantum Mechanics
- Weyl Quantisation
- Moyal Quantisation
- **General Quantisation Principles:**
 - Symplectic and Poisson Structures
 - Deformations and Lie Algebras: A Nontrivial Example
 - Crash Course in homological algebra, I. Examples
- **Exercises 2: Poisson Structures, Quantisation and Cohomology:**
 - Crash Course in Homological Algebra, II. Hochschild Homology
 - Hochschild Cohomology of C^∞ -Functions: Hochschild–Kostant–Rosenberg Theorem
 - Obstructions and deformation theory: Examples
- **Exercises 3: Hochschild Homology and Cohomology: Obstructions Theory:**
 - Deformation Quantisation of Cotangent Bundles
 - Lie Algebra Cohomology: Vey Class
 - Lecomte and de Wilde's Theorem: Quantisation of Symplectic Manifolds
- **Exercises 4: Obstructions and Deformation Quantisation of Symplectic Manifolds:**
 - Fedosov Quantisation: Abelian Connections
 - Fedosov Quantisation and Its Properties
 - Properties, Generalisations and Applications of Fedosov Quantisation (A Survey)
- **Exercises 5: Fedosov Quantisation:**
 - Higher Homotopy Algebras: Topological Background and Definitions
 - Maurer–Cartan Equations and Kontsevich's Theorem
 - Kontsevich's Construction
- **Exercises 6: Higher Homotopy Algebras, Kontsevich's Theorem:**
 - Kontsevich's Quantisation: Modifications and Related Questions
 - Applications of Kontsevich's Quantisation: Duflo's Isomorphism
- **Exercises 7: Kontsevich's Quantisation: Properties and Applications:**
 - Operads: History and Definitions
 - Tamarkin's Proof of Formality Theorem
- **List of References:**
 - Textbooks, Surveys and Monographs
 - Original Papers
- Index

ABOUT THE AUTHOR

Georgy Igorevich Sharygin obtained his PhD degree in Pure Mathematics from Lomonosov Moscow State University in 2000. Since 2001, he has been teaching various topics in Mathematics (elementary and advanced) in different schools and colleges in Moscow. His field of interest includes Euclidean Geometry, Differential Geometry, Algebraic Topology, Integrable Systems Theory, Noncommutative Geometry and Deformation Theory.

For orders and enquiries, please contact us:

FEEL
Books

FEELBOOKS PVT. LTD.

DELHI

4381/4 Ansari Road, Daryaganj, New Delhi 110002

Pushpendra Kumar

Mobile: +91 9015043442

Tel: +91-11-47472630

Email: orders@feelbooks.in

BENGALURU

C-22, Brigade MM, KR Road, Jayanagar 7th Block, Bengaluru 560070

Shekar Reddy

Mobile: +91 9945234476

Tel: +91-80-26762129

Email: bangalore@feelbooks.in

MUMBAI

Vijay Kumar

Mobile: +91 9871176434

Email: vkumar@feelbooks.in

CHENNAI

G Srinivasan

Mobile: +91 9003047502

Email: gsrinivasan@feelbooks.in

KOLKATA

Dhrubajyoti Bhattacharjee

Mobile: +91 9836160013

Email: dbhattacharjee@feelbooks.in

HYDERABAD

K.S.Vishwanath

Mobile: +91 9871745850

Email: kvishwanath@feelbooks.in

For Catalogues & title lists: marketing@feelbooks.in



www.feelbooks.in

