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Introductory Quantum Optics

This book provides an elementary introduction to the subject of quantum optics, the study of the quantum-mechanical nature of light and its interaction with matter.

The presentation is almost entirely concerned with the quantized electromagnetic field. Topics covered include single-mode field quantization in a cavity, quantization of multimode fields, quantum phase, coherent states, quasi-probability distribution in phase space, atom–field interactions, the Jaynes–Cummings model, quantum coherence theory, beam splitters and interferometers, nonclassical field states with squeezing etc., tests of local realism with entangled photons from down-conversion, experimental realizations of cavity quantum electrodynamics, trapped ions, decoherence, and some applications to quantum information processing, particularly quantum cryptography. The book contains many homework problems and a comprehensive bibliography.

This text is designed for upper-level undergraduates taking courses in quantum optics who have already taken a course in quantum mechanics, and for first- and second-year graduate students.

A solutions manual is available to instructors via solutions@cambridge.org.

CHRISTOPHER GERRY is Professor of Physics at Lehman College, City University of New York. He was one of the first to exploit the use of group theoretical methods in quantum optics and is also a frequent contributor to *Physical Review A*. In 1992 he co-authored, with A. Inomata and H. Kuratsuji, *Path Integrals and Coherent States for Su (2) and SU (1, 1)*.

PETER KNIGHT is a leading figure in quantum optics, and in addition to being President of the Optical Society of America in 2004, he is a Fellow of the Royal Society. In 1983 he co-authored *Concepts of Quantum Optics* with L. Allen. He is currently Head of the Physics Department of Imperial College and Chief Scientific Advisor at the UK National Physical Laboratory.

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Introductory Quantum Optics

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PUBLISHED BY THE PRESS SYNDICATE OF THE UNIVERSITY OF CAMBRIDGE
The Pitt Building, Trumpington Street, Cambridge, United Kingdom

CAMBRIDGE UNIVERSITY PRESS
The Edinburgh Building, Cambridge, CB2 2RU, UK
40 West 20th Street, New York, NY 10011–4211, USA
477 Williamstown Road, Port Melbourne, VIC 3207, Australia
Ruiz de Alarcón 13, 28014 Madrid, Spain
Dock House, The Waterfront, Cape Town 8001, South Africa

http://www.cambridge.org

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First published 2005

Printed in the United Kingdom at the University Press, Cambridge

Typefaces TimesNewRoman 10/13 pt. and Universe *System* LaTeX 2$_\varepsilon$ [TB]

A catalog record for this book is available from the British Library

Library of Congress Cataloging in Publication data
Gerry, C. C. (Christopher C.)
Introductory quantum optics / Christopher Gerry, Peter Knight.
p. cm.
Includes bibliographical references and index.
ISBN 0 521 82035 9 – ISBN 0 521 52735 X (paperback)
1. Quantum optics. I. Knight, Peter (Peter L.) II. Title.
QC446.2.G47 2004
535′.15 – dc22 2004051847

ISBN 0 521 82035 9 hardback
ISBN 0 521 52735 X paperback

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C. C. G. dedicates this book to his son, Eric.
P. L. K. dedicates this book to his wife Chris.

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Acknowledgements

This book developed out of courses that we have given over the years at Imperial College London, and the Graduate Center of the City University of New York, and we are grateful to the many students who have sat through our lectures and acted as guinea pigs for the material we have presented here.

We would like to thank our many colleagues who, over many years have given us advice, ideas and encouragement. We particularly thank Dr. Simon Capelin at Cambridge University Press who has had much more confidence than us that this would ever be completed. Over the years we have benefited from many discussions with our colleagues, especially Les Allen, Gabriel Barton, Janos Bergou, Keith Burnett, Vladimir Buzek, Richard Campos, Bryan Dalton, Joseph Eberly, Rainer Grobe, Edwin Hach III, Robert Hilborn, Mark Hillery, Ed Hinds, Rodney Loudon, Peter Milonni, Bill Munro, Geoffrey New, Edwin Power, George Series, Wolfgang Schleich, Bruce Shore, Carlos Stroud Jr, Stuart Swain, Dan Walls and Krzysztof Wodkiewicz. We especially thank Adil Benmoussa for creating all the figures for this book using his expertise with Mathematica, Corel Draw, and Origin Graphics, for working through the homework problems, and for catching many errors in various drafts of the manuscript. We also thank Mrs. Ellen Calkins for typing the initial draft of several of the chapters.

Our former students and postdocs, who have taught us much, and have gone on to become leaders themselves in this exciting subject: especially Stephen Barnett, Almut Beige, Artur Ekert, Barry Garraway, Christoph Keitel, Myungshik Kim, Gerard Milburn, Martin Plenio, Barry Sanders, Stefan Scheel, and Vlatko Vedral: they will recognize much that is here!

As this book is intended as an introduction to quantum optics, we have not attempted to be comprehensive in our citations. We apologize to authors whose work is not cited.

C. C. G. wishes to thank the members of the Lehman College Department of Physics and Astronomy, and many other members of the Lehman College community, for their encouragement during the writing of this book.

P. L. K. would like especially to acknowledge the support throughout of Chris Knight, who has patiently provided encouragement, chauffeuring and vast amounts of tea during the writing of this book.

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Our work in quantum optics over the past four decades has been funded by many sources: for P. L. K. in particular the UK SRC, SERC, EPSRC, the Royal Society, The European Union, the Nuffield Foundation, and the U. S. Army are thanked for their support; for C. C. G. the National Science Foundation, The Research Corporation, Professional Staff Congress of the City University of New York (PSC-CUNY).

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