Preface

The motto of *connectivity and superconductivity* is that the solutions of the Ginzburg–Landau equations are qualitatively influenced by the topology of the boundaries. Special attention is given to the “zero set”, the set of the positions (usually known as “quantum vortices”) where the order parameter vanishes. The paradigm of connectivity and superconductivity is the Little–Parks effect, discussed in most textbooks on superconductivity.

This volume is intended to serve as a reference book for graduate students and researchers in physics or mathematics interested in superconductivity, or in the Schrödinger equation as a limiting case of the Ginzburg–Landau equations.

The effects considered here usually become important in the regime where the coherence length is of the order of the dimensions of the sample. While in the Little–Parks days a lot of ingenuity was required to achieve this regime, present microelectronic techniques have transformed it into a routine. Moreover, measurement and visualization techniques are developing at a pace which makes it reasonable to expect verification of distributions, and not only of global properties.

Activity in the field has grown and diversified substantially in recent years. We have therefore invited experts ranging from experimental and theoretical physicists to pure and applied mathematicians to contribute articles for this book. While the skeleton of the book deals with superconductivity, micronetworks and generalizations of the Little–Parks situation, there are also articles which deal with applications of the Ginzburg–Landau formalism to several fundamental topics, such as quantum coherence, cosmology, and questions in materials science.

The sequence of the chapters in the book follows similarity of subjects rather than authors’ disciplines, so that articles by physicists and by mathematicians are intermixed. We have made an effort to have all authors express themselves in a common language, but the reader will still identify differences in their styles.

Haifa,  
July 2000  

*Jorge Berger*  
*Jacob Rubinstein*
List of Contributors

Luís Almeida
Université de Nice
06108 Nice Cédex 02, France
luis@math.unice.fr

Jorge Berger
Ort Braude College
21982 Karmiel, Israel
phr76jb@tx.technion.ac.il

Fabrice Bethuel
Université Pierre et Marie Curie
75252 Paris Cédex 5, France
bethuel@ann.jussieu.fr

Carlos Bolech
Rutgers University
Piscataway, NJ 08854, USA
bolech@pion.rutgers.edu

Vital Bruyndoncx
Katholieke Universiteit Leuven
3001 Leuven, Belgium
Vital.Bruyndoncx@fys.kuleuven.ac.be

Gustavo Buscaglia
Centro Atómico Bariloche
8400 Bariloche, Argentine
gustavo@cab.cnea.gov.ar

José Castro
Universidad Nacional de San Juan
5400 San Juan, Argentine
jicastro@server.ffha.unsj.edu.ar

Pierre-Gilles De Gennes
ESPCI
75005 Paris, France
Pierre-Gilles.DeGennes@espci.fr

Guy Deutscher
Tel Aviv University
69879 Tel Aviv, Israel
chava@post.tau.ac.il

Sanatan Digal
Universitat Bielefeld
33615 Bielefeld, Germany
digal@Physik.Uni-Bielefeld.DE

Bernard Helffer
Université Paris-Sud
91405 Orsay, France
Bernard.Helffer@math.u-psud.fr

Maria Hoffmann-Ostenhof
Universität Wien
1090 Vienna, Austria
mho@nelly.mat.univie.ac.at

Thomas Hoffmann-Ostenhof
Universität Wien
1090 Vienna, Austria
Thomas.Hoffmann.Ostenhof@esi.ac.at
Charles Kuper
Technion – Israel Institute of Technology
3200 Haifa, Israel
carol@physics.technion.ac.il

Antony Leggett
University of Illinois at Urbana-Champaign
Urbana, IL 61801-3080, USA
tony@cromwell.physics.uiuc.edu

Arturo L´opez
Centro Atómico Bariloche
8400 Bariloche, Argentine
aloj@cab.cnea.gov.ar

Victor Moshchalkov
Katholieke Universiteit Leuven
3001 Leuven, Belgium
victor.moshchalkov@fys.kuleuven.ac.be

Mark Owen
Technische Universität Wien
1090 Vienna, Austria
mowen@wiener.fam.tuwien.ac.at

Rajarshi Ray
Institute of Physics
751005 Bhubaneswar, India
rajarshi@iopb.res.in

Jacob Rubinstein
Technion – Israel Institute of Technology
3200 Haifa, Israel
koby@math.technion.ac.il

Supratim Sengupta
Institute of Physics
751005 Bhubaneswar, India
supratim@iopb.res.in

Ajit Srivastava
Institute of Physics
751005 Bhubaneswar, India
ajit@iopb.res.in

Peter Sternberg
Indiana University
Bloomington, IN 47405, USA
sternber@indiana.edu

Lieve Van Look
Katholieke Universiteit Leuven
3001 Leuven, Belgium
lieve.vanlook@fys.kuleuven.ac.be