PRINCIPLES AND APPLICATIONS OF SUPERCONDUCTING QUANTUM INTERFERENCE DEVICES

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PRINCIPLES AND APPLICATIONS OF SUPERCONDUCTING QUANTUM INTERFERENCE DEVICES

Edited by Antonio Barone

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PREFACE

When I was invited to act as editor of a book concerning SQUIDs, I considered the idea very stimulating as well as extremely challenging. Indeed, to what extent it was possible to make an interesting and comprehensive volume on the subject was a nontrivial question.

As a result, I believe that the contribution of excellent authors, together with the selection of the topics, guarantees for the high quality standard of the present book. However, it certainly cannot be considered exhaustive or conclusive, this matter continuously growing.

The volume lies halfway between a textbook and a multi-author collection of critical reviews. The latter aspect emerges in the introductory material of each chapter which can somewhat overlap. However, without preventing a large scale coherence of the whole text, this leads to rather self contained chapters. This choice can better provide "individual" messages for the various scientific communities interested in the physics of SQUIDs and their specific applications. Indeed the smooth introduction of each chapter allows the reader to skip, at least in a first reading, the other ones without a serious lack of continuity.

The first chapter provides an extensive background for the comprehension of the physics underlying the SQUID structures focusing mainly on the D.C. configuration and leaving classical and modern aspects of the R.F. devices to the second chapter. The description of very advanced technology and important aspects of device fabrication are given in chapter 3. In chapter 4, an extensive discussion on the most important topic of Biomagnetism, the Neuromagnetic studies, is given in detail. Chapter 5 deals with a further new challenging area, namely the SQUID technology for space applications. A description of the variety of applications of SQUIDs to the world of fundamental physics is contained in chapter 6. The last chapter gives an account of the status of high T_c Superconducting SQUIDs, which includes extremely interesting results and important notions for projections of this extremely stimulating topic.

As it will appear from the reading of the book, SQUID's technology has reached a degree of maturity which legitimates the great interest and research efforts devoted to the topic during the last two decades. This not only for the stimulating underlying physics but also for the concrete perspectives of industrial applications to which high- T_c materials add a further interest. Indeed, as stated by a great pioneer of the field, John Clarke, "*given the world-wide effort on the new superconductors there is every reason to be optimistic about the long-term future of SQUIDs based on these materials*".

I hope that the present book, providing both basic aspects and recent progresses of SQUIDS technology, might offer a realistic and stimulating picture of the state-of-the-art, contributing towards a further development of the field toward a variety of applications.

I gladly take the opportunity to thank, here, the several authors who have contributed to this volume and the directors of the various museums and organizations who kindly provided the photographs and slides used for the chapters separations. Thanks are also due to Mrs. Anna Maria Mazzarella for her valuable assistance throughout the editing.

***Professor of Structure of Matter, Physical Sciences Department, Faculty of Engineering, University of Naples and Director of the Project "Superconductive and Cryogenic Technologies" of the Italian National Research Council.**

CONTRIBUTORS TO THE VOLUME

- B. Cabrera, *Physics Department, Stanford University, Stanford, California, USA*
- P. Carelli, *Dipartimento di Energetica, Università di L'Aquila, L'Aquila and I.E.S.S., CNR, Rome, Italy*
- P. Chaudhari, *IBM Research Division, T. J. Watson Research Center, Yorktown Heights, New York, N.Y., USA*
- R. Gross, *Lehrstuhl Experimentalphysik II, Universität Tübingen, Tübingen, Germany*
- M. Koyanagi, *Electrotechnical Laboratory, Umezono, Tsukuba, Ibaraki, Japan*
- L. Narici, *Dipartimento di Fisica, Università di Roma "Tor Vergata", Rome, Italy*
- M. Nisenoff, *Electronics Science and Technology Division, Naval Research Laboratory, Washington, D.C., USA*
- G. Paternò, *ENEA, C.R.E. Frascati, Rome, Italy*
- G. L. Romani, *Istituto di Fisica Medica, Università "G. D'Annunzio", Chieti, Italy and I.E.S.S., CNR, Rome, Italy*
- V. I. Shnyrkov, *Institute for Low Temperature Physics and Engineering, Ukr. SSR Academy of Sciences, Kharkov*
- S. Takada, *Electrotechnical Laboratory, Umezono, Tsukuba, Ibaraki, Japan*
- G. M. Tsoi, *Institute for Low Temperature Physics and Engineering, Ukr. SSR Academy of Sciences, Kharkov*

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