

# Lecture Notes in Physics

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T. Paszkiewicz (Ed.)

## Physics of Phonons

Proceedings of the XXIII Winter School of Theoretical Physics  
Held in Karpacz, Poland, February 16–28, 1987

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Springer-Verlag

Berlin Heidelberg New York London Paris Tokyo

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ISBN 3-540-18244-6 Springer-Verlag Berlin Heidelberg New York  
ISBN 0-387-18244-6 Springer-Verlag New York Berlin Heidelberg

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© Springer-Verlag Berlin Heidelberg 1987  
Printed in Germany

Printing: Druckhaus Beltz, Hemsbach/Bergstr.;  
Bookbinding: J. Schäffer GmbH & Co. KG., Grünstadt  
2153/3140-543210



Participants of the first week



Participants of the second week

## P R E F A C E

This volume contains the proceedings of the 1987 Karpacz Winter School on the Physics of Phonons.

The decisive role played by phonons in condensed matter is well known. They mediate interactions between various quasi-particles. Their presence changes almost every characteristic of condensed matter. Phonons carry the energy and quasi-momentum and interact with external fields.

Over the past few years a number of sophisticated theoretical and experimental methods of study and new subjects of research have emerged, which have considerably broadened the scope of phonon physics. One should mention in particular new methods of phonon spectroscopy, excitations in glasses, dynamics of surfaces and interfaces, and phonons in quasi-crystals.

Obviously it is impossible to present all these achievements during a two-week school and in one volume, therefore we have selected several topics, which correspond to the first three parts of the volume. Part I is devoted to the foundations of the dynamics of condensed media, including surface vibrations and localization of phonons. Problems of phonon kinetics with the emphasis on phonon spectroscopy are presented in the second part. The interaction of phonons with electrons is discussed in the third part. The fourth part contains selected contributed talks.

I am grateful to Professor A.A. Maradudin for a review paper on the current status of phonon physics.

I express my deep gratitude to the lecturers who came to Karpacz despite different obstacles and the usual lack of time, and discussed their and other work in the broad, instructive way required by the school format. I wish to thank them also for their efforts to produce work of the highest scientific and pedagogical quality even under pressure of time.

There are many people I want to acknowledge. Major credit goes to the Organizing Committee - Janusz Jedrzejewski (secretary), Jan Lorenc (treasurer), Zbigniew Strycharski (technical assistance), Jerzy Cisło, Tadeusz Hałaczek, Paweł Misiak, Paweł Morawiec, Czesław Oleksy, Zygmunt Petru, Aleksandra Podolska-Strycharska, Danuta Skrajna for their input and advice. It was a privilege to work with them.

I would like to express my indebtedness to colleagues from the Institute of Physics of the Polish Academy of Sciences in Warsaw, especially to Professor Andrzej Czachor, for taking care of our guests.

Finally, I am grateful to the authorities of Wrocław University, especially to the Rector, Professor Jan Mozrzyński, for their financial and moral support.

Wrocław, May 1987

Tadeusz Paszkiewicz  
Director of the XXIII School

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