

## Momentum and pseudomomentum of light and sound

R. Peierls

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*Preface from the Usp. Fiz. Nauk editor of the translation of the article into Russian.* The name of Rudolph Peierls is well known to physicists. The results obtained by him belong to very different areas of theoretical physics. R. Peierls introduced into solid state physics umklapp processes. In dislocation theory there is a Peierls force. He worked in nuclear theory and in foundations of quantum electrodynamics. To him belong some of the earliest in world literature monographs on the theory of metals and on quantum theory of the solid state, and together with O. Frisch, R. Peierls gave an estimate of the critical mass of U-235.

R. Peierls had on many occasions visited the Soviet Union, presented papers and gave lectures. Already in the 1930's he visited Leningrad several times. He was married there. R. Peierls and Landau were friends. They coauthored two papers.

R. Peierls is now more than eighty years old. Quite recently he spent several weeks in Moscow. He was the guest of several institutes of the Academy of Sciences (the Institute of Physics Problems, the Institute of Theoretical Physics, the P. N. Lebedev Physics Institute of the Academy of Sciences, the Leningrad Physicotechnical Institute). R. Peierls is a remarkable conversationalist. Having participated in many of the scientific events of the physics of the twentieth century, he takes pleasure in sharing his reminiscences. Conversations with him are a source of true delight.

In his publications, R. Peierls always solved problems which were simple to pose but had great depth. The problem of momentum and pseudomomentum without doubt belongs to such problems. It appears that R. Peierls has thought about pseudomomentum for many years. Pseudomomentum and its role in the kinetics of solids are forever associated with the name of Peierls. In 1931, R. Peierls introduced umklapp processes for pseudomomentum in crystals, and in 1990 at a seminar at the Institute of Physics Problems of the Academy of Sciences, he reported the work the translation of which we now bring to the attention of the readers of *Uspekhi Fizicheskikh Nauk*. There is no doubt that the observations of Rudolph Peierls will be of interest to all those who are interested in the really deep problems of macroscopic physics.

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