

## Coherent radiation sources

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*Coherent Radiation Sources*/Eds. A. W. Sáenz and H. Überall. Springer-Verlag, Berlin; Heidelberg, New York; Tokyo, 1985, pp. 235. (Topics in Current Physics. V. 38).

This book is a collection of articles devoted to the production of electromagnetic radiation when fast charged particles travel in crystals and across an interface between two media. In the first article (A. W. Sáenz and H. Überall) a brief discussion is given of the theory of coherent bremsstrahlung: its kinematics, its theory in the Born approximation, the results of numerical calculations for specific cases. The second article (G. D. Kovalenko, L. Ya. Kolesnikov, and A.L. Rubashkin) is devoted to the experimental study of coherent bremsstrahlung. A description is given of the experimental arrangement for such experiments and the results are discussed of experiments on measuring the frequency distribution, the dependence on orientation of total intensity, of the polarization of the radiation and of the prop-

erties of the radiation at low electron energy.

Channeling in a bent crystal is discussed in the article by R. A. Carrigan, Jr. and W. M. Gibson. The foundations of the theory are stated and various applications are discussed including the extraction of the beam from the accelerator and the focusing of beams.

The classical theory of radiation accompanying channeling is discussed in the article of V. V. Beloshitkiĭ and M. A. Kumakhov including radiation accompanying plane and axial channeling and comparison with bremsstrahlung.

The article of J. V. Andersen, E. Bonderup, and E. Laegsgaard is devoted to the quantum theory of radiation from charged particles accompanying channeling. Radiation in the cases of plane and axial channeling, the damping and line width, the effect of thermal scattering and applications are discussed.

The article of B. L. Berman and S. Datz is devoted to

experiments on radiation accompanying channeling. The experimental apparatus is described and data are discussed on radiation in the cases of axial and plane channeling both for electrons and for positrons. In his article G. B. Yodh examines transition radiation from a relativistic charged particle in a semi-infinite medium, in a plate and in a multi-layered medium. Results are quoted of an experimental test of the theory, and the use of transition radiation for the detection of high energy particles and as a source of radiation are discussed.

A distinguishing feature of the topics in this collection is the large contribution made by Soviet physicists to the development of the problem being discussed. This is related to the fact that a more detailed presentation of the topics of many articles in this collection can be found in monographs published in our country. This to a greater extent relates to the theoretical problems discussed in the collection and to a lesser extent to the experimental ones. Therefore for the Soviet reader the articles describing and discussing experiments are of greater interest.

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