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Ewald Dynamical Diffraction Symposium

Over 250 scientists from four continents gathered at the University of Oklahoma on 23 March 1978 to honor Professor Paul P. Ewald in his 90th year with a special, day-long, Dynamical Diffraction Symposium. Recent developments in the applications of dynamical diffraction theory, created by Professor Ewald in 1917, were presented in a series of eight invited papers. It is noteworthy that his theory has only begun to have wide impact within the last twenty years, as experimental techniques and other theorists have caught up with it. The first paper was presented by Professor Ewald, who received standing ovations before he commenced and after he completed his talk.

It is now well known that Ewald's discussion of his doctoral thesis with Max von Laue led to ideas which played a significant part in the discovery of X-ray diffraction by von Laue, Friedrich and Knipping. Ewald then worked out much of the early theory of such diffraction, including the concept of the reciprocal lattice. Professor Ewald, with his wife Ella (who also attended the meeting) and their four children fled Nazi Germany in the 1930's and went to Cambridge in 1937, then to Queen's College, Belfast in 1939, and finally to the Polytechnic Institute of Brooklyn in 1949, where he remained until 1959. The Ewalds now live in Ithaca, New York.

The Dynamical Diffraction Symposium was a special part of the American Crystallographic Association meeting for 1978. The invited speakers were asked to submit manuscripts based on their talks for possible publication in *Acta Crystallographica* as a group, in homage to Professor Ewald. Each manuscript received was accorded normal editorial and refereeing treatment.

J. M. COWLEY
R. A. YOUNG
Chairmen,
Dynamical Diffraction Symposium

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A Review of my Papers on Crystal Optics 1912 to 1968*

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Abstract

The theory of the diffraction of X-rays by crystals was developed by Ewald as part of a unified study of the interaction of light of all wavelengths with crystals, beginning with the work for his 1912 thesis and extending to his papers in 1968. The formulation of the problem in terms of the interaction of electromagnetic radiation with a periodic array of dipoles is placed in its historical perspective and is compared with Laue's version based on the assumption of a continuous electron density distribution. The Borrmann effect, hinted at in 1917, is derived readily from consideration of the dispersion surface.

* *Editors' note:* This summary of his contributions to crystal optics was prepared by Professor Ewald as a basis for his talk at the Oklahoma meeting and for private circulation. In response to insistent requests from the Editors, Professor Ewald has granted permission for the publication of the summary in full.

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Introduction

On this happy occasion of a symposium celebrating my ninetieth birthday may I be excused for giving a review of my own papers? The main reason for this is that very few have read my original papers. Yet I see some merits in them as compared to later expositions of the same subjects. Besides, my work has been attempting to establish the unity of classical optics throughout the entire range of wavelengths from infrared to X-rays. This general aspect has received little resonance.

The papers I am going to comment on fall into two groups. There are four main papers under the title *Zur Bergründung der Kristalloptik* (*Foundations of Crystal Optics*; Ewald, 1916*a*,*b*, 1917, 1937; quoted hereafter as *Optics* I–IV). Of these the first is a slight remodelling of my Munich PhD thesis of 1912 *Dispersion und Doppelbrechung in Elektronengittern* (*Kristallen*) [*Dispersion and Double Refraction in Lattices of Electrons* (*Crystals*)] (Ewald, 1912), while the later papers