Preface

Commemorating Paul Drude

Paul Drude (born Brunswick, Germany, 12 July 1863, died Berlin, Germany, 6 July 1906) took over the prestigious position of Editor-in-Chief of the then renamed Annalen der Physik from Gustav Wiedemann in 1900. In the years to come the Annalen soon became established as the most important journal of the physics community – illustrated for instance by Einsteins seminal papers in 1905. To commemorate Drude's sudden death in 1906, we have collected a dozen original contributions which demonstrate the significance of his scientific contributions to present research.

The issue mainly focusses on optical properties of solids but also covers questions of ionic and electronic transport (contribution by Joachim Maier) which were about to be separated in Drude's time. In the course of his research Paul Drude established what is now called electrodynamics of solids, as discussed by Mathias Schubert. Triggered by the discovery of electromagnetic waves by Heinrich Hertz, Drude performed experiments down to low frequencies; an even larger range is covered by the experiments presented by Peter Lunkenheimer et al., in order to investigate the metal-insulator transition in manganates. The contributions by Peter Wlfle et al. and Hidetoshi Fukuyama deal with the effect of magnetic fields on the dynamical properties of special metallic systems. Achim Rosch gives some theoretical insight into the optical properties of clean metals. Although the Drude model is well accepted and belongs to the basics of solid state optics, there are only few experiments which nicely demonstrate the Drude response, as illustrated in the article by Martin Dressel and Marc Scheffler. An overview on the electrodynamics of correlated electron systems is given by Sasha Dordevic and Dimitri Basov, followed by Leonardo Degiorgi's contribution. The influence of phonons in the optical spectra is analyzed by Jules Carbotte and Ewald Schachinger. The optical properties of high temperature superconductors are a strongly debated topic which is the focus of the remaining two contributions.

In the opening article, Dieter Hoffmann presents the life of Paul Drude and introduces the scientific surrounding in which he was working. The impact of his oevre is discussed by Manuel Cardona and Werner Marx based on the analysis of bibliographic data bases. The special issue closes with a

reprint of Max Planck's commemoration address published in Annalen der Physik shortly after Drude's demise.

Drude was able to bridge the gap between macroscopic phenomena which are experimentally accessible and microscopic processes such as the motion of electrons. He linked Maxwell's electrodynamics and the electron theory which surfaced following Thomson's discovery of the electron. Although he was not able to incorporate quantum-mechanical aspects, the Drude model still is omnipresent and is continuously adjusted to modern questions in condensed matter physics.

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