On the verge of Umdeutung in Minnesota: Van Vleck and the correspondence principle

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Abstract

In October 1924, The Physical Review, a relatively minor journal at the time, published a remarkable two-part paper by John H. Van Vleck, working in virtual isolation at the University of Minnesota. Van Vleck used Bohr's correspondence principle and Einstein's quantum theory of radiation to find quantum formulae for the emission, absorption, and dispersion of radiation. The paper is similar but in many ways superior to the well-known paper by Kramers and Heisenberg published the following year that is widely credited to have led directly to Heisenberg's Umdeutung paper. As such, it clearly shows how strongly the discovery of matrix mechanics depended on earlier work on the application of the correspondence principle to the interaction of matter and radiation.

Keywords:	Dispersion theory, John H. Van Vleck, Correspondence Principle, Bohr-Kramers-Slater (BKS) theory, Virtual oscillators, Canonical perturbation theory, Matrix mechanics
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