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THE UNIVERSITY of WISCONSIN MADISON

Department of Physics Colloquium
2009 Julian E. Mack Lecture

Friday, September 18, 2009 • 4:00 P.M. • 2241 Chamberlin Hall

cookies & coffee served at 3:30 p.m

On the Verge of Umdeutung in Minnesota

John H. Van Vleck and the Transition from the Old Quantum Theory to Matrix Mechanics

Michel Janssen

University of Minnesota

Hosts: Lin and Huber

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. Using Bohr's correspondence principle and Einstein's quantum theory of radiation along with advanced techniques from classical mechanics, Van Vleck showed that quantum formulae for emission, absorption, and dispersion of radiation merge with their classical counterparts in the limit of high quantum numbers. The paper is similar in many ways to the paper on dispersion theory by Kramers and Heisenberg a few months later that led directly to the famous Umdeutung (reinterpretation) paper of July 1925 with which Heisenberg laid the foundations for matrix mechanics. This makes Van Vleck's paper extremely valuable for the reconstruction of the genesis of matrix mechanics. It also makes it tempting to ask why Van Vleck did not take the next step and develop matrix mechanics himself.