
JOURNAL CLUB

Einstein and his light quanta

by

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ABSTRACT

This talk will cover some of the early developments which – more than 20 years later – led to the formulation of a consistent quantum theory. I will discuss Planck’s derivation of his blackbody radiation law, and then focus on Einstein’s 1905 paper “Concerning an heuristic point of view toward the emission and transformation of light”. In this remarkable article he not only proposed the idea of light quanta, but he also went on to predict the linear relationship between the stopping potential of photoelectrons and the frequency of the incident light (the photoelectric effect). For almost 20 years Einstein stood alone on the subject of light quanta, although his other and better known achievements – particularly in the special and general theory of relativity – were widely recognized. In 1923 the experimental demonstration of the Compton effect made the assumption of radiation quanta carrying energy and momentum inevitable. It was only then that Einstein was taken seriously. The dilemma of reconciling this particle picture of light with Maxwell’s very successful wave theory led to the formulation of quantum mechanics in 1925/26. This resolved the issue for most physicists, but Einstein never acknowledged the new theory as complete.

His work on the light quanta remains one of the most imaginary physics articles, and his most revolutionary contribution to physics. It eventually won him the Nobel prize.

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Elvey Bldg. Globe Room
3:45 pm