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Abraham Pais Prize Talk: The Joy of History

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Physicists and historians of physics share a common goal, the quest for understanding, but their objects are different: Physicists attempt to understand Nature, while historians attempt to understand the past, finding both the challenge and joy of history in exploring the contingencies of historical events, their dependence on scientific, biographical, sociopolitical, cultural, and other factors, and shaping them into a coherent narrative. My first example will focus on the history of the photon concept, in particular on the work of Arthur Holly Compton between 1916 and 1922 that led to his discovery of the Compton effect, whose understanding ultimately rested on a close examination of his laboratory notebooks. I will then turn to two episodes in the history of nuclear physics. The first deals with a controversy between 1922 and 1927 between Ernest Rutherford and James Chadwick at the Cavendish Laboratory in Cambridge and Hans Pettersson and Gerhard Kirsch at the Institute for Radium Research in Vienna that involved their fundamentally different experimental observations and theoretical interpretations of the artificial disintegration of nuclei whose resolution could only be understood after uncovering crucial correspondence between the protagonists. The second episode traces George Gamow's creation and development of the liquid-drop model of the nucleus in 1928 and 1929 and its subsequent development in two stages, first by Werner Heisenberg and Carl Friedrich von Weizsäcker from 1933 to 1936, and second by Niels Bohr and Fritz Kalckar in 1936 and 1937, both of which merged in the minds of Lise Meitner and Otto Robert Frisch at the end of 1938 to yield the correct interpretation of nuclear fission, an act of creation whose understanding rested on a detailed analysis of the published literature.