

Abstract Submitted
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James Franck and the Experimental Discovery of Metastable States CLAYTON GEARHART, St. John's Univ (Minn) — In 1913 and 1914, James Franck and Gustav Hertz published their experiments on inelastic collisions of slow electrons with helium and mercury vapor atoms. Famously, they thought they were measuring ionization energies, and not, as we understand it today, excitation energies. Franck and Hertz shortly found themselves in the army, and neither resumed experimental work until after the Great War. Nevertheless, these questions were cleared up over the course of the war, primarily through the work of experimentalists in North America, who remeasured the ionization energy of mercury and showed that Franck and Hertz had not detected ionization. After the war, Franck returned to experiments on and theoretical analyses of the collisions of slow electrons with helium atoms, in competition with others in England and America. This time, Franck and his associates were able to measure the ionization energy, and, in the process, to throw new light on the non-combining singlet and doublet (later found to be triplet) spectral series in helium. They also proposed for the first time the existence of metastable states, first in helium, and later in mercury and other elements, at a time when selection rules and theories of transition probabilities were in their infancy.

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