# Timeline of Events in Chapters 5–8 of *Uncertainty*

| Year | Event |
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| 1885 | Balmer derives an empirical equation that models the known visible emission lines for hydrogen atoms. |
| 1892 | Michelson observes that some of the Balmer lines for hydrogen are actually doublets. |
| 1897 | Thomson discovers the electron. |
| 1900 | Planck suggests that black-body emission—energy released from a hot object—occurs in discrete packets, or *quanta*, that cannot be further subdivided. |
| 1904 | Thomson proposes the "plum pudding" model of the atom, in which electrons sit within a "soup" of positive charge. |
| 1905 | Einstein develops a theoretical model to explain the photoelectric effect using Planck's quantum. |
| 1911 | Rutherford demonstrates that an atom's positive charge is confined to a small, dense nucleus at center of atom; his model does not address the electron. |
| 1913 | Bohr introduces his model of the hydrogen atom in which a single electron orbits a nucleus, and in which orbits are quantized. |
| 1914 | Bohr speculates that the existence of elliptical orbits and general relativity might explain the doublets observed in the hydrogen atom spectrum. |
| 1916 | Milliken's experiments confirm Einstein's theoretical explanation of the photoelectric effect. |
| 1920 | Bohr and Sommerfeld propose theoretical model of the atom that allows for elliptical orbits of electrons around the nucleus; the model is based on three integer quantum numbers that describe size, elasticity, and orientation of these orbits. |
| 1920 | Sommerfeld introduces a fourth quantum number to explain the anomalous Zeeman effect. Heisenberg subsequently develops theory that requires that this quantum number take on values that are odd multiples of ½. |
| 1920 | Bohr establishes his correspondence principle stating that the results of quantum mechanics should agree with classical mechanics in the limit of large quantum numbers. |
| 1922 | Compton shows that the scattering of X-rays by electrons is a quantum event in which light behaves as a particle. |
| 1924 | Bohr, Kramers, and Slater (BKS) propose a model for the interaction of light with atoms in which the atom behaves as a virtual oscillator allowing for interaction with light as a wave. Because the model is probabilistic, it does not require conservation of energy in individual collisions. |
| 1925 | Further experiments by Compton show that individual collisions between X-rays and electrons elastic and conserve energy, disproving the BKS model. |