The Rationale for the Present Book

Perhaps the most critical problem facing present-day particle physicists is to delineate the relationship between classical and quantum systems. This relationship has many facets. Particle-wave duality is one. The concept of the point particle is another. And the concept of particle mass is yet another. The electron, as the lightest of the charged particles, represents a fundamental "ground state," and many of the essential problems in the murky area between the domains of classical and quantum physics can be brought into focus by studying just this one particle. Thus the present book is centered on questions that arise in connection with the electron, and in particular with its mass, which has remained an unsolved, and indeed almost unexplored, mystery. Each student of physics, beginner and professional alike, has to fashion for himself a way of thinking about the electron. If, after reading this book, the reader views this topic somewhat differently than before, the efforts of the author will have been amply rewarded. When physicists were confronted with the properties of the electron, they made a conceptual leap into the unknown: they concluded that the electron does not obey classical laws with respect to mechanics (as connected to the spin of the electron), and also with respect to electrodynamics (as connected to the magnetic moment of the electron).