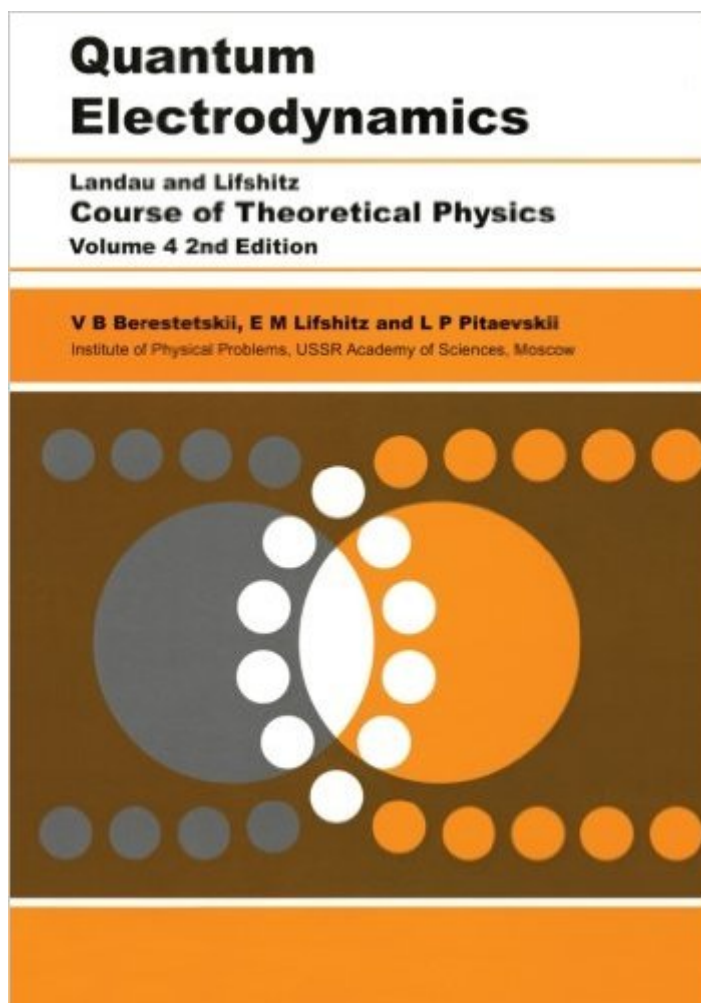


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Quantum Electrodynamics, Second Edition: Volume 4 (Course Of Theoretical Physics)



Synopsis

Several significant additions have been made to the second edition, including the operator method of calculating the bremsstrahlung cross-section, the calculation of the probabilities of photon-induced pair production and photon decay in a magnetic field, the asymptotic form of the scattering amplitudes at high energies, inelastic scattering of electrons by hadrons, and the transformation of electron-positron pairs into hadrons.

Book Information

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Customer Reviews

This book gives a solid introduction to the simplest of gauge theories, that of the Abelian gauge field governing the interactions between photons and charged particles. The emphasis is on doing calculations, and so readers who need a more in-depth mathematical or "foundational" overview of quantum electrodynamics may be disappointed. Quantum field theory of course was not founded on the need for mathematical rigor in physics, but instead has its origins in reconciling quantum mechanics with the theory of special relativity. This reconciliation has sometimes been a rough road, and in many places employs some sophisticated but eccentric "trickery" on the part of the researchers. It is these tricks that are the most difficult to generalize, to the annoyance of mathematicians who want to put quantum field theory on a more rigorous mathematical foundation. But in spite of the use of these oddities quantum field theory is not magical, and has proven to be one of the most precise physical theories ever constructed. Some of the highlights of the book: 1.

The chapter on exact propagators and vertex parts is particularly illuminating, especially the discussions on Dyson's equation, Ward's identity, and the physical conditions needed for renormalization. Dyson's equation relates the vertex part to the exact propagator, and the authors derive it using two different approaches in the book: one using the concepts of reducible and irreducible diagrams, the other using direct calculation and taking the Fourier transform. Readers who go on in quantum field theory will find that this equation is usually called the Dyson-Schwinger equation and can be derived using "functional methods.

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