Gauge Theories of Weak Decays

Gauge Theories of Weak Decays: The Standard Model and the Expedition to New Physics Summits by Cam Nguyen

★★★★★ 5 out of 5

Language	: English
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Text-to-Speech	: Enabled
Screen Reader	: Supported
Enhanced typesetting	: Enabled
Print length	: 650 pages
X-Ray for textbooks	: Enabled

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The Standard Model of particle physics is a theory that describes three of the four fundamental forces (the electromagnetic, weak, and strong forces) in nature. The Standard Model is based on the idea of gauge symmetries, which are symmetries that relate the laws of physics to the properties of the particles that interact with those forces.

Gauge theories of weak decays are used to describe the interactions of the weak force, which is responsible for the decay of radioactive particles. The weak force is one of the four fundamental forces in nature, and it is responsible for the decay of radioactive particles.

This book provides a comprehensive to gauge theories of weak decays, covering both theoretical and experimental aspects. It is ideal for graduate students and researchers in particle physics and related fields.

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Theoretical Framework

The theoretical framework of gauge theories of weak decays is based on the Standard Model of particle physics. The Standard Model is a quantum field theory that describes the interactions of the electromagnetic, weak, and strong forces.

In the Standard Model, the weak force is mediated by the W and Z bosons. The W bosons are charged particles, and they interact with the charged leptons (electrons, muons, and taus) and the quarks. The Z boson is a neutral particle, and it interacts with the neutral leptons (neutrinos) and the quarks.

The interactions of the weak force are described by the electroweak theory. The electroweak theory is a gauge theory, which means that it is based on a symmetry group. The symmetry group of the electroweak theory is the SU(2) x U(1) group.

The SU(2) group is a group of rotations in three-dimensional space. The U(1) group is a group of rotations in one-dimensional space. The electroweak theory is based on the idea that the laws of physics are invariant under the SU(2) x U(1) group.

Experimental Results

The experimental results of gauge theories of weak decays have provided strong support for the Standard Model of particle physics. The most important experimental results include:

- The discovery of the W and Z bosons
- The measurement of the masses of the W and Z bosons
- The measurement of the couplings of the W and Z bosons to the charged leptons and quarks

These experimental results have confirmed the predictions of the Standard Model of particle physics and have provided strong support for the theory.

Applications

Gauge theories of weak decays have a wide range of applications in particle physics and related fields. These applications include:

- The study of the properties of the weak force
- The development of new particle detectors
- The search for new particles and forces

Gauge theories of weak decays are a powerful tool for understanding the fundamental laws of nature. They have provided strong support for the Standard Model of particle physics and have opened up new avenues of research.

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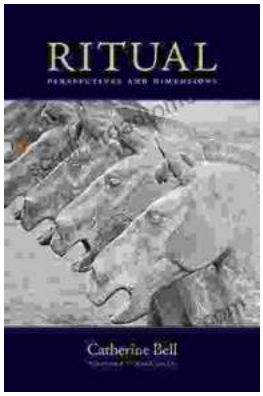

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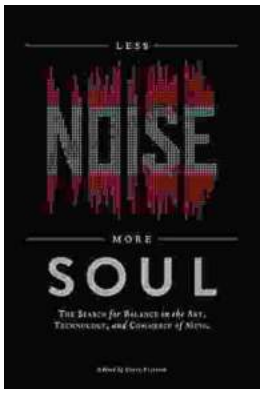

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