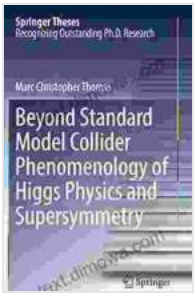
# Beyond the Standard Model: Unlocking the Secrets of Higgs Physics and Supersymmetry

The Standard Model of particle physics, the cornerstone of modern physics, has been remarkably successful in describing a wide range of physical phenomena. However, it is not without its limitations. One major limitation is its inability to explain the existence of dark matter and dark energy, which together account for about 95% of the universe. Another limitation is its failure to provide a satisfactory explanation for the origin of mass.

Beyond the Standard Model (BSM) physics seeks to address these limitations by extending the Standard Model with new particles and interactions. Two of the most popular BSM theories are Higgs physics and supersymmetry.

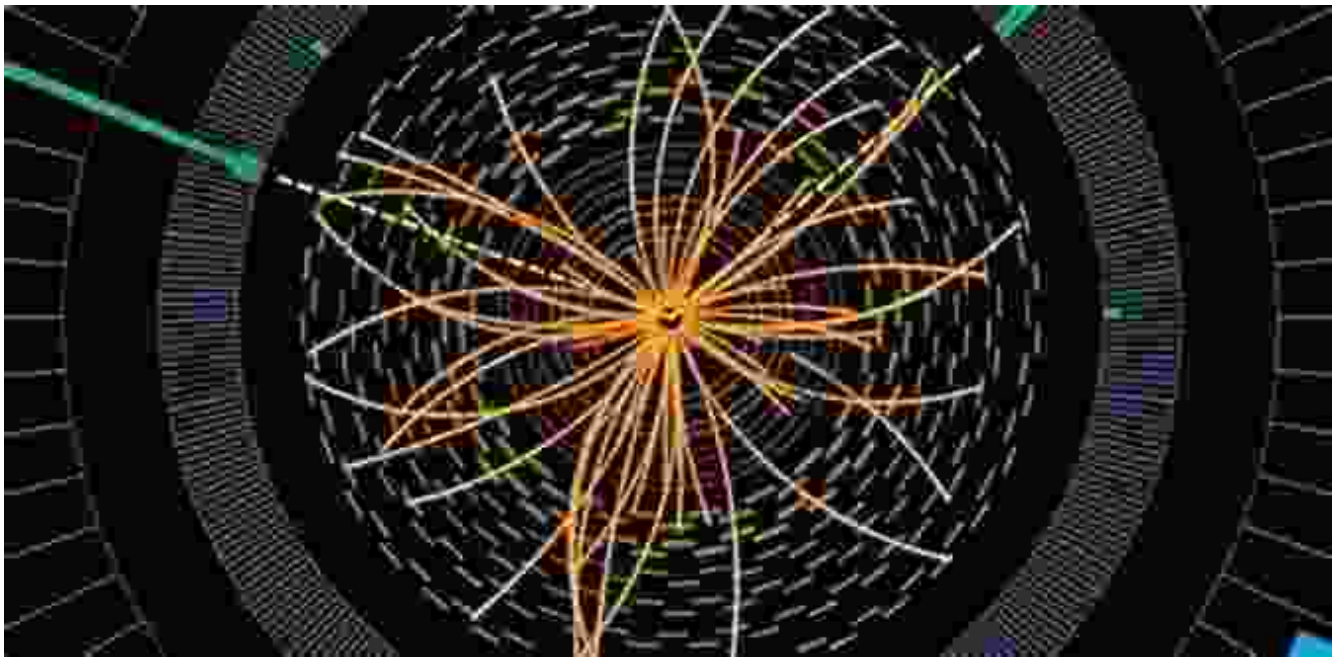



## Beyond Standard Model Collider Phenomenology of Higgs Physics and Supersymmetry (Springer Theses)

by Mary Cronk Farrell

4.7 out of 5

| | |
|---|---|
| Language | : English |
| File size | : 5892 KB |
| Text-to-Speech | : Enabled |
| Screen Reader | : Supported |
| Enhanced typesetting | : Enabled |
| Word Wise | : Enabled |
| Print length | : 196 pages |



## Higgs Physics

The Higgs boson is a massive elementary particle that plays a crucial role in giving other particles their mass. It was discovered at the Large Hadron Collider (LHC) in 2012 and its discovery was a major breakthrough in particle physics.

The Higgs boson is associated with the Higgs field, which is a field that permeates the entire universe. Particles interact with the Higgs field, which gives them their mass. The more strongly a particle interacts with the Higgs field, the heavier it is.

The Higgs boson is a very important particle, but it is not the only particle that is responsible for mass. Other particles, such as the top quark, also interact with the Higgs field and contribute to their mass.

## Supersymmetry

Supersymmetry is a BSM theory that predicts the existence of a new set of particles that are called superpartners. These particles are identical to their Standard Model counterparts except that they have a different spin. For example, the superpartner of the electron is called the selectron and it has a spin of 0.

Supersymmetry is a very elegant theory that has the potential to solve many of the problems with the Standard Model. However, it has not yet been experimentally confirmed.

### Beyond the Standard Model: Collider Phenomenology

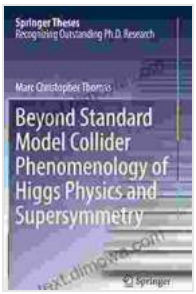
The LHC is the world's largest particle accelerator and it is the only facility that can currently be used to search for BSM particles. The LHC is currently running at a center-of-mass energy of 13 TeV and it is expected to continue running at this energy until 2024.

The LHC has already discovered the Higgs boson and it is now searching for other BSM particles. A number of different BSM theories predict that new particles will be produced at the LHC and researchers are working hard to find these particles.

If the LHC does not find any new particles, it will mean that the Standard Model is still correct and that BSM physics is beyond the reach of current experiments. However, if the LHC does find new particles, it will be a major breakthrough that will open up a new era in particle physics.

BSM physics is a very exciting field of research. It has the potential to solve many of the problems with the Standard Model and to provide us with a deeper understanding of the universe. The LHC is currently the only facility

that can be used to search for BSM particles and it is expected to continue running until 2024. If the LHC does not find any new particles, it will mean that the Standard Model is still correct and that BSM physics is beyond the reach of current experiments. However, if the LHC does find new particles, it will be a major breakthrough that will open up a new era in particle physics.



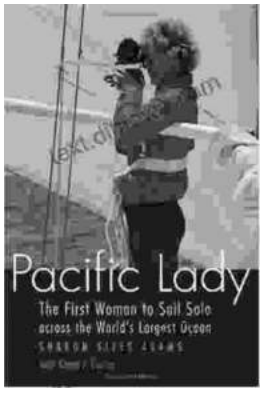

## Beyond Standard Model Collider Phenomenology of Higgs Physics and Supersymmetry (Springer Theses)

by Mary Cronk Farrell

4.7 out of 5

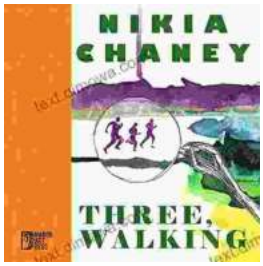
| | |
|---|---|
| Language | : English |
| File size | : 5892 KB |
| Text-to-Speech | : Enabled |
| Screen Reader | : Supported |
| Enhanced typesetting | : Enabled |
| Word Wise | : Enabled |
| Print length | : 196 pages |






## The First Woman To Sail Solo Across The World's Largest Ocean Outdoor Lives

Krystyna Chojnowska-Liskiewicz is a Polish sailor who became the first woman to sail solo across the world's largest ocean, the Pacific Ocean. Her...




## Three Walking: An Immersive Journey into the Heart of Human Experience

Immerse yourself in the enchanting world of "Three Walking" by Nikia Chaney, a captivating novel that transports you through time and space, delving into the...