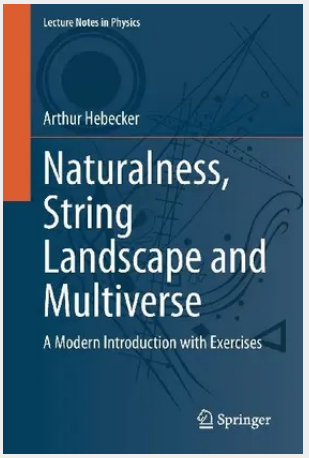
Hebecker

Naturalness, String Landscape and Multiverse

A Modern Introduction with Exercises



This book presents a string-theoretic approach to new ideas in particle physics, also known as Physics Beyond the Standard Model, and to cosmology. The concept of Naturalness and its apparent violation by the low electroweak scale and the small cosmological constant is emphasized. It is shown that string theory, through its multitude of solutions, known as the landscape, offers a partial resolution to these naturalness problems as well as suggesting more speculative possibilities like that of a multiverse.

The book is based on a one-semester course, as such, it has a pedagogical approach, is self-contained and includes many exercises with solutions. Notably, the basics of string theory are introduced as part of the lectures.

These notes are aimed at graduate students with a solid background in quantum field theory, as well as at young researchers from theoretical particle physics to mathematical physics. This text also benefits students who are in the process of studying string theory at a deeper level. In this case, the volume serves as additional reading beyond a formal string theory course.

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