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Sommario/riassunto	This book provides a remarkable and complete survey of important questions at the interface between theoretical particle physics and cosmology. After discussing the theoretical and experimental physics revolution that led to the rise of the Standard Model in the past century, the author reviews all the major open puzzles, among them the hierarchy problem, the small value of the cosmological constant, the matter-antimatter asymmetry, and the dark matter enigma, including the state-of-the-art regarding proposed solutions. Also addressed are the rapidly expanding fields of thermal dark matter, cosmological first-order phase transitions and gravitational-wave signatures. In addition, the book presents the original and interdisciplinary PhD research work of the author relating to Weakly-Interacting-Massive-Particles around

the TeV scale, which are among the most studied dark matter candidates. Motivated by the absence of experimental evidence for such particles, this thesis explores the possibility that dark matter is much heavier than what is conventionally assumed.