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# The Universe Untangled

Modern physics for everyone



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Modern physics for everyone

**Abigail Pillitteri**

Morgan & Claypool Publishers

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*Dedicated to my parents.*

*Thank you both for everything.*



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# Preface

This book aims to shed light on the fascinating nature of the universe. We'll begin with a brief history of time and the fundamental forces and particles at play. Mind-bending concepts follow, including Einstein's theories of relativity, which describe how spacetime stretches and warps. After that, we'll dive into quantum physics, which covers the mysterious ways that particles and light behave. Finally, we'll explore black holes, dark matter, dark energy, and recent discoveries in science, including gravitational waves that ripple through spacetime.

*The Universe Untangled* is written for everyone. A professor may find it useful for a course such as General Science, Philosophy of Physics, Philosophy of Science, or Astronomy. A high school teacher might recommend it to curious students. And any popular science enthusiast is sure to be inspired by its contents. So welcome, and enjoy!

# Acknowledgments

A warm thank you to: Professor Stephen Barr, for all of his time and effort through the editing process; Professors Barry Walker, Stuart Pittel, Harry Shipman, and John Clem for their help along the way; Brian Greene, for inspiring me to pursue physics; all of my professors at Boston College, especially Professor Graf for his time and patience; and my family and friends who have provided feedback and support. Thank you all!

# Author biography

## Abigail Pillitteri

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Abigail Lorraine Pillitteri has been proclaimed a modern day Renaissance woman. Now a supervising editor of educational science content, she has written for the U.S. Department of Energy and major publishers of next-generation educational products. Her contributions include the design and content production of educational games, digital mathematics lessons, professional development courses, and science worktexts. Independently, she has published three books of poetry, and she paints colorful conceptual artwork. Her free-verse poetry is rhythmic, emotionally raw, and honest, with occasional analogies to physics that connect the worlds of science and soul. Some of her paintings are also infused with scientific concepts, and her artwork has been displayed in events, galleries, and homes nationwide.

Abigail was born in small-town New Jersey to John and Gail Pillitteri, a home-remodeler and an artist/assistant teacher. She earned her Bachelor of Science in Physics & Philosophy at Boston College and a Master of Science in Physics at the University of Delaware. Her career path as a science writer and editor became clear during graduate school, where she was recognized for her keen writing abilities. Physicists Brian Greene and Neil deGrasse Tyson quickly became her figures of inspiration. She strives to make the miraculous concepts of physics accessible to all audiences, and to show the world how the realms of art and science are deeply connected.