

# Connecting the Fundamental Laws of Physics to Our Observable World



Sean Carroll  
Research Professor, Physics

## CURRENT RESEARCH

Cosmological theories move us closer to explaining the origin of the universe

The universe we see around us exhibits mind-boggling complexity, but operates on the basis of very simple underlying rules. Discovering what these rules are, and how they work together to create the rich environment of the world we observe, are some of the deepest questions in all of science. Dr. Sean Carroll, of the California Institute of Technology, is a theoretical physicist who asks profound questions about the universe and our place within it. His research is knowledge-based and curiosity-inspired, as he works to answer foundational challenges such as: Where did the universe come from? What are the underlying laws of physics? and How do complex structures arise from simple rules? Dr. Carroll's research is making enormous, breathtaking progress in addressing these ancient questions.

Collaboration with other researchers, graduate students, and postdoctoral researchers is crucial to Dr. Carroll's research. These collaborations help to make greater strides towards answering difficult questions and bring in people with different kinds of expertise to contribute to the interdisciplinary fertilization of ideas. In addition to his highly collaborative work, Dr. Carroll's work is unique because he takes a big picture point of view that answers questions about the universe in the broadest possible terms. He is pioneering an interdisciplinary approach that brings together ideas from particle physics, cosmology, gravitation, quantum mechanics, statistical mechanics, and the theory of complexity.

Current research includes:

- Emergence and Complexity: According to the Second Law of Thermodynamics, the universe grows more disorderly over time; nevertheless, complex structures such...

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## AFFILIATION



California Institute of Technology

## EDUCATION

- Ph.D., in Astronomy, 1993 . Harvard University
- B.S., in Astronomy and Astrophysics, 1988 . Villanova University

## AWARDS

- Andrew Gemant Award American Institute of Physics, 2014
- Royal Society Winton Prize for Science Books, 2013
- American Physical Society Fellow, 2010
- Villanova University Alumni Medallion, 2006
- Packard Foundation Fellow, 2005

## RESEARCH AREAS

Technology, Space, Space

## FUNDING REQUEST

Your contributions will support Dr. Carroll's research as he investigates fundamental challenges in theoretical physics. Funding will allow him to bring together researchers to tackle interdisciplinary questions that are not funded by traditional funding sources, and pioneer new and risky approaches to big questions. All contributions are useful - a few thousand dollars would support graduate students, while hundreds of thousands could fund postdoctoral researchers at a crucial stage in their career.