Lisa Randall, one of the world's most influential physicists, explains why we need more than three dimensions to understand the cosmos

The idea of gravity isn’t always what it seems. The most widely accepted theory of gravity, general relativity, was developed by Albert Einstein a century ago, but it fails to explain the biggest mystery of the cosmos: the nature of dark matter. What dark matter is, how it interacts with the ordinary matter that makes up all the objects in the universe, and whether or not dark matter is made up of the same force field that underlies gravity are all problems that remain unsolved.

Randall, a Harvard professor of theoretical physics, was one of the first scientists to suggest a possible solution. In a series of papers published in the 1980s, she proposed that our universe is not three-dimensional, but has an additional dimension that we cannot directly observe. This extra dimension is thought to be incredibly small, perhaps as small as the size of a proton, and is thought to be curled up in a way that makes it invisible to us.

Randall’s idea was based on a branch of mathematics called Kaluza-Klein theory, which proposes that extra dimensions are a natural consequence of the quantum nature of gravity. The idea was not considered seriously at the time, but it has since become a cornerstone of string theory, a theoretical framework that attempts to unify all the forces of nature.

Randall’s work in this area has been recognized with numerous awards, including the Dirac Prize in Theoretical Physics and the Frank Renthal Award. She has been named one of the world’s 100 most influential scientists by Time magazine, and was the first woman to win the Fermi Award for excellence in theoretical physics.

Randall’s research has also led to a number of important predictions, including the existence of new particles that could explain dark matter and the possibility of a new form of gravity that could explain the mysterious disappearance of stars and galaxies.

In recent years, Randall has also become a vocal advocate for science education and outreach, and has written several popular science books, including “Dark Matter and the Dinosaurs.” She is currently working on a book about the history of physics and the role of women in the field.

Randall is a frequent speaker at conferences and public events, and her work has been widely featured in the media. She has also been involved in efforts to promote science education and outreach, including serving as a mentor for young scientists and participating in science communication projects.

Randall’s contributions to theoretical physics have earned her a place among the most influential scientists of the 21st century, and her work continues to shape our understanding of the universe and our place in it.