

**Thursday, February 29, 2024**

Refreshments at 3:15pm in PSF 101

Colloquium from 3:30pm - 4:30pm outside PSF 101

## **The Real Fifth Force: Quantum Statistics**

**Distinguished Professor  
Frank Wilczek**

**Arizona State University  
Massachusetts Institute of Technology**

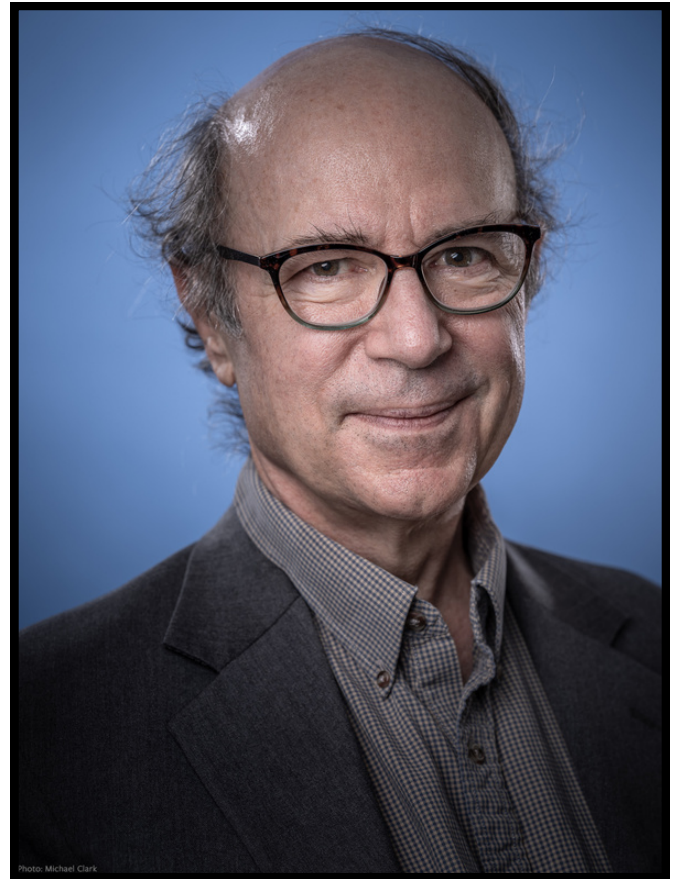


Photo Credit: Michael Clark

### **Abstract:**

It is common to speak of four basic forces of nature. But deep principles of quantum theory, under the intimidating (and misleading) name “quantum statistics”, produce additional effective forces that play an absolutely crucial role in the physical world, as I will describe. Over the last few decades there has been something of a revolution in our understanding of quantum statistics, deepening our understanding of traditional possibilities and giving birth to “anyons”: a new class of emergent particles that have a sort of memory. Recently anyons have recently passed from theoretical proposal to experimental reality, and they are opening new vistas for quantum information technology.

### **Biography:**

Frank Wilczek is a theoretical physicist, author, and intellectual adventurer. He has received many prizes for his work, including a Nobel Prize in Physics and Templeton Prize.

Frank has made seminal contributions to fundamental particle physics, cosmology and the physics of materials. His current theoretical research includes work on Axions, Anyons, and Time Crystals. These are concepts in physics which he named and pioneered. Each has become a major focus of research world-wide. In recent years Frank has become fascinated with prospects for expanding perception (especially color perception) through technology. He is developing hardware and software tools for this.

Frank has authored several well-known books and writes a monthly “Wilczek’s Universe” feature for the Wall Street Journal. His latest book, “Fundamentals: Ten Keys to Reality”, distills the most profound and mind-expanding insights of modern science, and explores their implications for questions that are usually considered philosophical or even theological. Early reviews have been enthusiastic, including this from the New York Times: “Whether or not you’re accustomed reading physics for pleasure, the Nobel Laureate Frank Wilczek’s \*Fundamentals\* might be the perfect book for the winter of this plague year ... Wilczek writes with breathtaking economy and clarity, and his pleasure in his subject is palpable . . .”

Wilczek received a B.S. at the University of Chicago in 1970, and a PhD in physics at Princeton University in 1974. Currently he is the Herman Feshbach professor of physics at the MIT; Chief Scientist of the T. D. Lee Institute and Wilczek Quantum Center, Shanghai Jiao Tong University; Distinguished Professor at Arizona State University; and Professor at Stockholm University.

He has been married to Betsy Devine since 1973. They have two daughters.

Host: Prof. Maulik Parikh

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