



# URMILA MAHADEV

**Early Life:** An American mathematician and computer scientist Urmila Mahadev was raised in Los Angeles, California. She grew up in a home that valued academic achievement, and her parents are physicians. She became very interested in quantum computing while she was an undergraduate at the University of Southern California. Her academic career was influenced by a course taught by Leonard Adleman. She pursued advanced research in quantum computing and cryptography as a result of her early education.

**Contributions to Her Field:** By solving the problem of how a classical computer can verify the accuracy of a quantum computation, Urmila made an important contribution to quantum computing. She created an interactive proof system which allows a non-quantum user to verify that a quantum computer honestly followed instructions. Her work uses Learning With Errors (LWE) for combining post-quantum cryptography with quantum computation. This was the first example that a single quantum computer could be reliably checked by a fully classical verifier. Her findings are regarded to be crucial to future safe, reliable quantum computing.

**Education:** With money from a National Science Foundation Graduate Research Fellowship, Urmila finished her graduate studies at the University of California, Berkeley. Professor Umesh Vazirani was in charge of her work. She created interactive proof systems at Berkeley that let a classical computer show that calculations made by a quantum computer are accurate. In 2018, she finished her Ph.D. She became assistant professor of computing and mathematical sciences at the California Institute of Technology after her postdoctoral studies at Berkeley.

**Adversity:** Urmila represents an underrepresented population in theoretical computer science and advanced mathematics as a woman of colour working in a field that is largely controlled by men. Concepts about who belongs in mathematical research have been questioned from her success. She also works in an innovative field where ability in both advanced physics and deep mathematics is important. Her career represents an example of the value of dedication and interdisciplinary education.

**Fun Facts:** She solved one of the biggest open problems in quantum computing at just 28 years old.

In 2018, she won the Machtey Award for her work on verifying quantum computers.

In 2021, she received the Maryam Mirzakhani New Frontiers Prize, celebrating early-career women mathematicians.

She combines math, physics, and cryptography in her research in unique ways.

She spent eight years in grad school working on a problem most people would have given up on.