

Google uses quantum computers to discover the fundamental laws of the universe

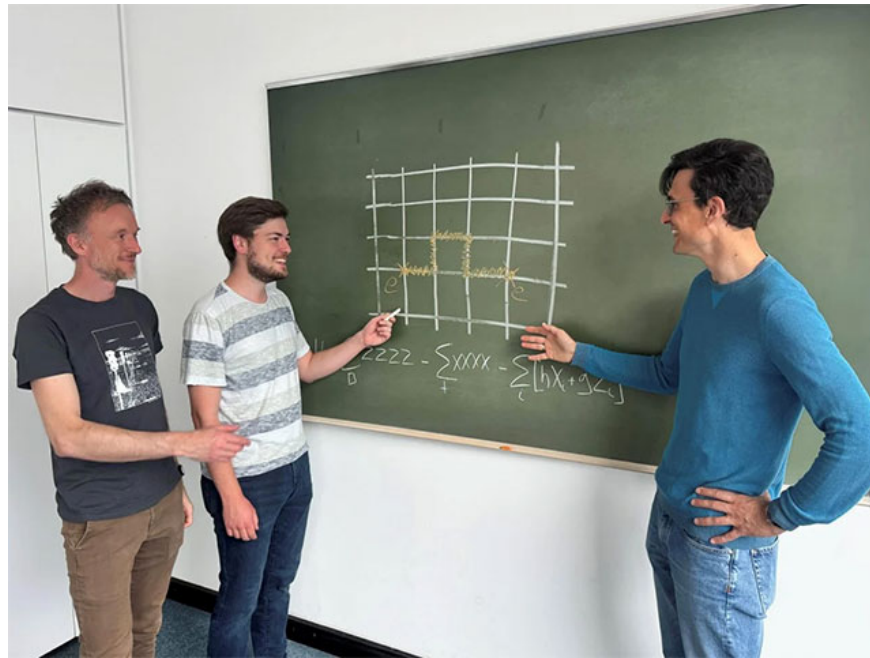
A team of researchers from Google Quantum AI, the Technical University of Munich, and Princeton used Google's quantum processor to simulate fundamental forces and particles, opening up new avenues for studying particle physics and the nature of space-time.

Researchers have used Google's quantum processor to simulate fundamental physics, opening up a new approach to understanding the forces and particles that underlie the universe.

The fundamental forces that shape the world around us are explained through incredibly complex theoretical models. However, studying these models is a huge challenge, because simulating them accurately is far beyond the capabilities of traditional supercomputers.

Now, scientists from the Technical University of Munich (TUM), Princeton University, and the Google Quantum AI team have demonstrated that quantum computers can become powerful tools for exploring this challenging field, opening the door to observing the most subtle movements of the fundamental components of nature.

The research, published in the journal *Nature*, marks a major step forward for quantum computing. The team successfully used Google's quantum processor to directly simulate fundamental interactions, demonstrating the technology's enormous potential for future scientific discoveries. The approach could help scientists gain a deeper understanding of particle physics, quantum materials, and even the nature of space and time. At the heart of the work is the goal of decoding the universe at its most fundamental level, using mathematical frameworks known as gauge **theories**.



Testing the 'rules of the game' of the universe in the lab

' Our work shows that quantum computers can help humans discover the fundamental rules that govern the universe, ' said co-author Professor Michael Knap, a researcher at the TUM School of Natural Sciences. ' By simulating these interactions in the lab, we can test theories in completely new ways. '

' Taking advantage of the power of quantum processors, we studied the dynamics of a special form of gauge theory, and observed how particles and the invisible 'strings' connecting them change over time, ' said Pedram Roushan, co-author of the paper at Google Quantum AI.

' By adjusting the effective parameters in our model, we can 'tune' the properties of these strings. They can vibrate wildly, become tightly bound, or even break ,' added lead author Tyler Cochran, a graduate student at Princeton. Data collected from the quantum processor revealed unique behaviors of these strings that have direct parallels to phenomena in high-energy particle physics, he explained.

The research findings highlight the potential of quantum computers to advance scientific discoveries in fundamental physics and beyond.

You finished reading the article "**Google uses quantum computers to discover the fundamental laws of the universe**" edited by the [TipsMake](#) team. We hope this article has provided you with many useful tech tips and tricks. You can search for similar articles on tips and guides. Thank you for reading and for following us regularly.