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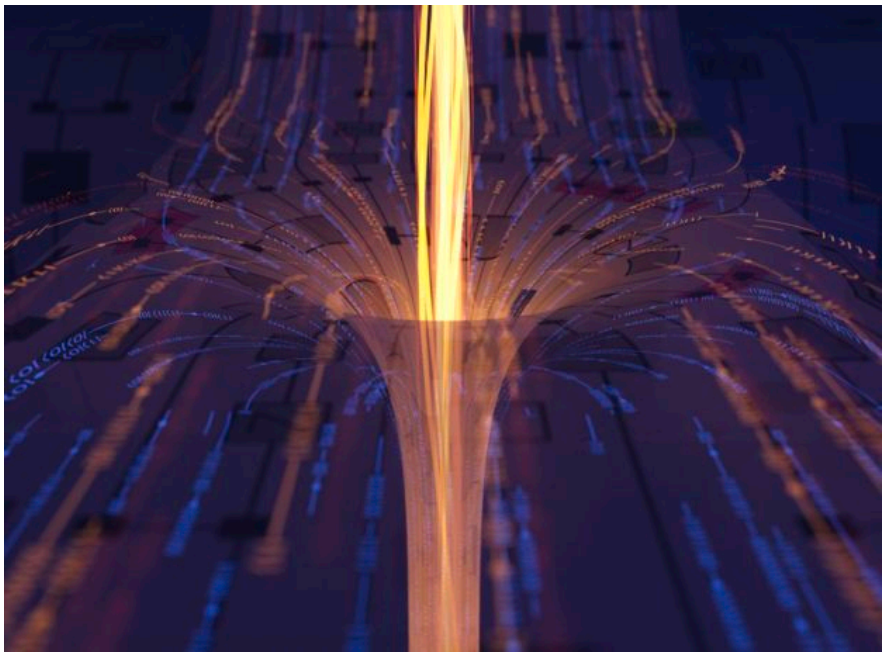
SELECTED NEWS

Traversable wormhole dynamics on a quantum processor



Source

Scientists have, for the first time, developed a quantum experiment that allows them to study the dynamics, or behavior, of a special kind of theoretical wormhole. The holographic principle, theorized to be a property of quantum gravity, postulates that the description of a volume of space can be encoded on a lower-dimensional boundary. A qubit can be used to probe the SYK traversable wormhole dynamics through the corresponding teleportation protocol. This can be realized as a quantum circuit, equivalent to the gravitational picture in the semiclassical limit of an infinite number of qubits. Here we use learning techniques to construct a sparsifed SYK model that we experimentally realize with 164 two-qubit gates on a nine-qubit circuit and observe the corresponding traversable wormhole dynamics. Their experiment was run on the Google Sycamore processor. By interrogating a two-dimensional gravity dual system, our work represents a step towards a program for studying quantum gravity in the laboratory.

This work successfully attempts to observe traversable wormhole dynamics in an experimental setting. Looking forwards, we anticipate that near-term quantum computers that extend beyond the capabilities of classical simulation will coincide with system sizes that provide new gravitational insight. At too large a value of N, semiclassical gravity describes system dynamics; at too small a value of N, relevant features may not be resolvable.

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IBM’s cryptographic bill of materials to speed up quantum-safe assessment

Quantum computing could one day solve important problems in business and science, but it also brings risks. The encryption schemes we use today to safeguard sensitive data — such as financial and health records — could be obsolete in a future where quantum computers reach their full potential. To address this need to move to quantum-safe solutions, our cryptography team behind the IBM Quantum Safe technology and NIST algorithm contributions has developed a new approach, dubbed Cryptography Bill of Materials (CBOMs). Telecommunications industry organization, GSMA, formed a Post-Quantum Telco Network Taskforce in September of this year — which IBM and Vodafone joined as initial members — to help define policy, regulation and operator business processes to protect telcos from this quantum future. Without quantum-safe controls, sensitive data, such as confidential business and customer information, could be at risk.

TAQCIT Annual Meeting

Quantum phenomena are favored by high-tech academia and industry in the 21st century. The investment in quantum computing is increasing daily, almost at the rate of geometric progression. The National Science and Technology Council will promote the quantum technology plan in 2022 and subsidize 17 research teams to advance in three major categories: 1. Universal quantum computer hardware technology, 2. Optical quantum technology, and 3. Quantum software technology and application development. This year's TAQCIT Annual Conference will be held on December 25. The content is vibrant to explain the general situation of the world's quantum technology and bring together leading academic scientists and researchers at home and abroad to share and exchange research results on quantum computers and related fields. Provide an interdisciplinary communication platform for researchers, practitioners, and educators, display and discuss the latest innovative research trends and concerns in the quantum computers and quantum computing field, and work together to challenge practical problems and solutions.

Website

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