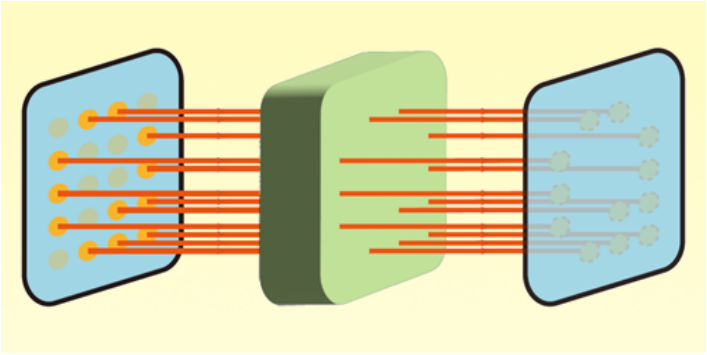
Teleporting More Quantum States at Once

Researchers have demonstrated the quantum teleportation of a 100-pixel image by a method that could help to scale up quantum networks.

By **Sophia Chen**

Quantum networks could allow information to be transmitted without the risk of eavesdropping. But quantum information is fragile and can easily be destroyed en route. Because quantum mechanics forbids making exact copies of an unknown quantum state, once the information is lost, it's lost for good. To overcome this problem, physicists rely on quantum teleportation to securely transfer unknown quantum states using shared entanglement. Now Jietai Jing of East China Normal University and colleagues have demonstrated a quantum-teleportation scheme with a much greater bandwidth than conventional techniques [1].

In conventional quantum teleportation, quantum states are usually sent one at a time, which limits the ability to transmit complex information such as images. Previous attempts at sending quantum states in parallel typically relied on multiplexing techniques in which multiple information channels are encoded in the properties of a single beam of light. Such techniques require the receiver to use complicated decoding schemes and make it difficult for the sender to manipulate individual channels independently.



Credit: Y. Lou *et al.* [1]

Jing and colleagues demonstrated a scheme in which a spatial light modulator is used to pattern a laser beam's transverse profile with a 10 × 10 grid of distinct spatial modes. Each of the 100 pixel-like modes in this array can be controlled independently to form an image. To transmit such an image securely, the sender mixes the information-carrying light field with one-half of a pair of entangled light fields that are shared between sender and receiver in advance. This interaction scrambles the transmitted information. When the receiver combines the scrambled light field with their half of the entangled resource, the full, 100-pixel image is reconstructed all at once.

Sophia Chen is a freelance science writer based in Columbus, Ohio.

REFERENCES

1. Y. Lou *et al.*, "Hundred-channel reconfigurable quantum teleportation," **Phys. Rev. Lett. 137, 080801 (2026).**