

# China's satellite sends unbreakable cipher from space

Chinese scientists have become the first to realize quantum key distribution from a satellite to the ground, laying the foundation for building a hack-proof global quantum communication network.

The achievement based on experiments conducted with the world's first quantum satellite, Quantum Experiments at Space Scale (QUESS), was published in the authoritative academic journal Nature on Thursday.

The Nature reviewers commented that the experiment was an impressive achievement, and constituted a milestone in the field.

Nicknamed "Micius" after a 5th century B.C. Chinese philosopher and scientist who is credited as the first person ever to conduct optical experiments, the 600-kilogram-plus satellite was sent into a sun-synchronous orbit at an altitude of 500 km on Aug. 16, 2016.

Pan Jianwei, lead scientist of QUESS and an academician of the Chinese Academy of Sciences (CAS), said the satellite sent quantum keys to ground stations in Xinglong, in north China's Hebei Province, and Nanshan near Urumqi, capital of northwest China's Xinjiang Uygur Autonomous Region.

Communication distance between the satellite and the ground stations varied from 645 km to 1,200 km, and the quantum key transmission rate from satellite to ground is up to 20 orders of magnitude more efficient than that expected using an optical fiber of the same length, said Pan.

When the satellite flies over China, it provides an experiment window of about 10 minutes. During that time, 300 kbit secure keys can be generated and sent by the satellite, according to Pan.

"That, for instance, can meet the demand of making an absolute safe phone call or transmitting a large amount of bank data," Pan said.

"Satellite-based quantum key distribution can be linked to metropolitan quantum networks where fibers are sufficient and convenient to connect numerous users within a city over 100 km. We can thus envision a space-ground integrated quantum network, enabling quantum cryptography – most likely the first commercial application of quantum information – useful at a global scale," Pan said.

The establishment of a reliable and efficient space-to-ground link for faithful quantum state transmission paves the way to global-scale quantum networks, he added.