Safe transmission of information has been a dream of human beings for thousands of years. However, any classical encryption algorithm based on computational complexity will in principle be cracked. Based on tests of quantum nonlocality, people have gained ability of active manipulations for quantum states, which leads to emerging of quantum information science. Quantum communication provides a unique technique whose unconditional security is strictly proved, which overcomes risks of classical encryption technology, and therefore solves the information transmission problem based on physics principle.

It becomes the most ideal development route to realize the global wide area quantum communication, by realization of the metropolitan area quantum communication network via fiber, connection among two neighboring cities via repeaters, and connection between two remote regions via satellite relay. At present, China's quantum communication technology and application level has been a leading position among the world. Urban quantum communication network technology has matured, which has already been applied in some areas of national information security. The Beijing-Shanghai Backbone fiber optical quantum communication network in a level of thousand kilometers has been established in the end of 2016. The quantum satellite Micius has been successfully launched, and satellite-ground quantum communication has been pioneered in the world. On this basis, by connecting to the optical fiber quantum communication network on the ground, one can constructed preliminarily a wide area quantum communication system. Based on wide area quantum communication networks, high precision global optical frequency transmission can be carried out, and some effects of quantum gravity and general relativity can be tested. At the same time, it also provides a platform for large-scale nonlocality testing for quantum mechanics.