



Micius: A Quantum-Enabled Satellite

Why in News

Recently, **satellite Micius** has sent **light particles to Earth** to establish the world's most secure communication link.

Key Points

▪ Micius:

- It is the **world's first quantum communications satellite**, launched by **China in 2016**.
- The satellite serves as the **source of pairs of entangled photons**.
 - Entangled photons are **twinned light particles** whose **properties remain intertwined** no matter how far apart they are.
 - If one of the photons is manipulated, the other will be similarly affected at the very same moment.
 - It is this **property that lies in the heart of the most secure forms of quantum cryptography** (the study of concepts like encryption and decryption).
 - If one of the entangled particles is used to create a key for encoding messages, only the person with the other particle can decode them.

▪ Recent Developments:

- Micius has **successfully brought [entanglement-based quantum cryptography](#) to its original ground stations 1,200 km apart** by sending simultaneous streams of entangled photons to the ground stations to establish a direct link between the two of them.
- The satellite provided entangled photons as a convenient resource for the quantum cryptography and the two ground stations then used them according to their agreed protocol.
- **None of the communication went through Micius** (i.e behaved like a blind transmitter) providing the ground stations a **robust and unbreakable cryptographic protection** without the need to trust the satellite.
- Until now, this had never been done via satellite or at such great distances.
- It has not been specified how the messages were transmitted in this instance but in theory it could be done by optical fibre, another communications satellite, radio or any other agreed method.
- Scientists have started using quantum encryption for **securing long-range communication** and Micius has been at the **forefront of quantum encryption** for several years.

▪ Quantum Race:

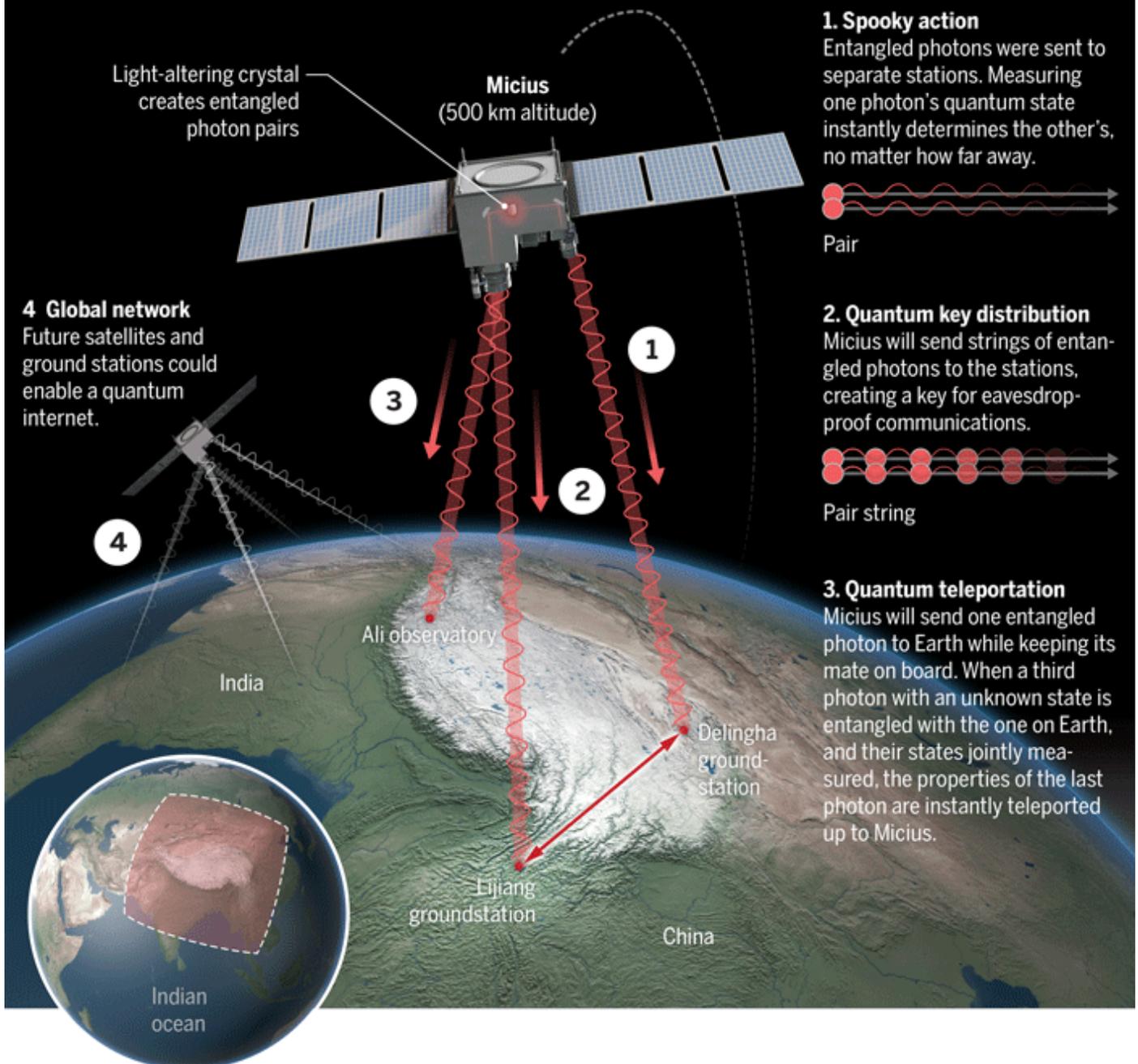
- The **disclosure of internet surveillance by western governments prompted China** to boost quantum cryptography research in order to create more secure means of communication.
- The launch of Micius and quantum communication systems with its help have been **compared to the effect Sputnik had on the space race** in the 20th century.

- Sputnik was the **first artificial Earth satellite** launched by the **Soviet Union** into an **elliptical low Earth orbit** on **4th October 1957**.
- Any country could **theoretically trust Micius** to provide entangled photons to secure its communications but the **satellite is a strategic resource** that other countries would **want to replicate** giving further boost to the quantum race which **has political and military implications** that are hard to ignore.

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Quantum leaps

China's Micius satellite, launched in August 2016, has now validated across a record 1200 kilometers the "spooky action" that Albert Einstein abhorred (1). The team is planning other quantum tricks (2-4).



Source: DTE

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