
Beam up my quantum state, Scotty!

FYST85

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1 Introduction

- Quantum teleportation protocol
- Why is it needed?
- Areas of application, quantum communications, quantum computers
- what is needed to realize it on a large scale, i.e. quantum repeaters, memory...
- EPR-pairs and bell basis

2 Experimental Evidence

Experimental evidence for quantum teleportation in quantum communications.

- Quantum teleportation has experimental evidence
- Experimental hurdles

2.1 Satellite Based

1400 km [1]

- Protocol used
- distance
- technical difficulties and innovations
- what does this mean for quantum communications?

2.2 Fibre Network Based

100 km [2]. Metropolitan [3]

- Protocol used
- distance

- technical difficulties and innovations
- what does this mean for quantum communications?

3 Teleportation of Complex Quantum Systems

- What is a complex system?
- How does the protocol differ from simple systems?
- Why is it important to be able to teleport complex quantum systems?
- Theoretical and experimental limits

4 Quantum Repeaters and Quantum Memory

Quantum internet [4]

- quantum repeater analogues to normal repeater?
- How to realize quantum memory
- why do we need quantum memory for quantum repeaters
- how much does a quantum repeater reduce attenuation
- how good are today's quantum repeaters?

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