

Extension of tests on basic principles of Quantum Mechanics using Quantum Communications to an orbiting terminal in Space

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The paradigm shift that Quantum Communications represent vs. classical counterpart allows envisaging the global application of Quantum Information protocols as the cryptographic key distribution as well as of the use of the qubits as a probe for fundamental tests of Quantum Mechanics and Gravity on a scale beyond terrestrial limits.

We shall report on the extension of tests on basic principles of Quantum Mechanics using Quantum Communications to an orbiting terminal in Space. Indeed, it was possible to demonstrate the Quantum Communications with Low-Earth-Orbit satellites using polarization degree of freedom to encode the qubits. Temporal modes were used to demonstrate the quantum interference along a Space channel will be also described.

The recent results on the extension to Space of the Gedankenexperiment proposed by John Wheeler on the wave- particle duality, then about the very nature of the quantum entities, will be described.

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