

Imperfect and Intertwined: Quantum Teleportation with Quantum Dots

As part of an international collaboration, scientists have succeeded in bringing quantum teleportation about using "imperfect quantum dots", i.e. artificial material structures.



Professor Rastelli

Physicist Prof. Klaus Jöns (University of Paderborn) explains: "*Quantum teleportation is when the photon state, i.e. a small light particle, is transferred to another. In simple terms, the transmitter and receiver are intertwined. This requires certain sources that produce indistinguishable photons and using deterministic photon sources is ideal. Quantum dots made out of a semiconductor material are usually used.*" Instead of focusing on producing ideal materials, scientists worked with imperfect quantum dots, aiming to identify teleportation with maximum reliability despite the circumstance. Sophisticated measurement methods were used to raise the "teleportation quality" to 84.2%.

Quantum dots made out of gallium arsenide - which were developed at JKU - were used. This has the advantage of being able to generate a highly intertwined state and

then being maximized by applying spectral filtering.

The resulting findings from the joint collaboration effort between the JKU (Prof. Armando Rastelli, Semiconductor Physics Division), the University of Paderborn, and Sapienza University in Rome have now been published in the Nature partner journal "Quantum Information".

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