Abstract Submitted
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Experimental realization of quantum teleportation from a photon to the vibration modes of a millimeter-sized diamond[1] YUANYUAN HUANG, PANYU HOU, XINXING YUAN, XIUYING CHANG, CHONG ZU, LI HE, CQI, IIIS, Tsinghua University, Beijing 100084, PR China, LUMING DUAN, CQI, IIIS, Tsinghua University, Beijing 100084, PR China; Department of Physics, University of Michigan, Ann Arbor, Michigan 48109, USA, CENTER FOR QUANTUM INFORMATION, IIIS, TSINGHUA UNIVERSITY, BEIJING 100084, PR CHINA TEAM, DEPARTMENT OF PHYSICS, UNIVERSITY OF MICHIGAN, ANN ARBOR, MICHIGAN 48109, USA TEAM — Quantum teleportation is of great importance to various quantum technologies, and has been realized between light beams, trapped atoms, superconducting qubits, and defect spins in solids. Here we report an experimental demonstration of quantum teleportation from light beams to vibrational states of a macroscopic diamond under ambient conditions. In our experiment, the ultrafast laser technology provides the key tool for fast processing and detection of quantum states within its short life time in macroscopic objects consisting of many strongly interacting atoms that are coupled to the environment, and finally we demonstrate an average teleportation fidelity $(90.6 \pm 1.0)\%$, clearly exceeding the classical limit of 2/3. Quantum control of the optomechanical coupling may provide efficient ways for realization of transduction of quantum signals, processing of quantum information, and sensing of small mechanical vibrations.

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