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Macroscopic quantum memories get entangled from far away[1]
ZHEN-SHENG YUAN, YU-AO CHEN, SHUAI CHEN, JÖRG SCHMIEDMAYER, JIAN-WEI PAN, PHYSIKALISCHES INSTITUT, RUPRECHT-KARLS-UNIVERSITÄT HEIDELBERG, GERMANY TEAM, HEFEI NATIONAL LABORATORY FOR PHYSICAL SCIENCES AT MICROSCALE AND DEPARTMENT OF MODERN PHYSICS, USTC TEAM, ATOMINSTITUT DER ÖSTERREICHISCHEN UNIVERSITÄTEN, TU-WIEN, AUSTRIA TEAM — We report an experimental implementation of a fundamental unit for long-distance quantum communication. By means of entanglement swapping, entanglement is generated between two remote atomic ensembles connected with either 6 m or 300 m fibre-based optical channel, where the flying qubits–two emitted photons from the atomic ensembles are sent to an intermediate station for a joint Bell-state measurement. Afterwards, the measurement induced entanglement between the atomic ensembles are verified by the violation of Bell's inequality or by an entanglement witness. The striking features, phase-error insensitiveness and scalable flexibility, promise the present setup as a fundamental unit for future quantum information processing.

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