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**14-qubit entanglement: creation and coherence<sup>1</sup>**

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We report the creation of multiparticle entangled states with up to 14 qubits. By investigating the coherence of up to 8 ions over time, we observe a decay proportional to the square of the number of qubits. The observed decay agrees with a theoretical model which assumes a system affected by correlated, Gaussian phase noise. This model holds for the majority of current experimental systems developed towards quantum computation and quantum metrology.

<sup>1</sup>Work done in collaboration with Thomas Monz, Philipp Schindler, Michael Chwalla, Daniel Nigg, William A. Coish, Maximilian Harlander, Wolfgang Haensel, Markus Hennrich, and Rainer Blatt.