Quantum computing: No turning back

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The first realizations of 'cluster states' and cluster-state quantum computation are reported in *Nature* this week (10 March issue, pp169-176). This represents a significant move from theory to reality for an alternative approach to quantum computing first proposed in 2001.

Anton Zeilinger and colleagues (University of Vienna, Austria) take Robert Raussendorf and Hans Briegel's ideas for computing, based on highly entangled clusters of many particles - in this case photons - and demonstrate that modifications to the entangled photons in such a state allows them to perform certain computing tasks. The entangled photons allow the system to encode information before computations begin and imprint a quantum logic circuit on the state, destroying its entanglement and making the process irreversible. Hence the name 'one-way quantum computing' for the system.

This article reports the first experimental demonstration of the one-way quantum computer, which radically changes how we think about quantum physics and opens up exciting possibilities for the experimental implementation of quantum computation.