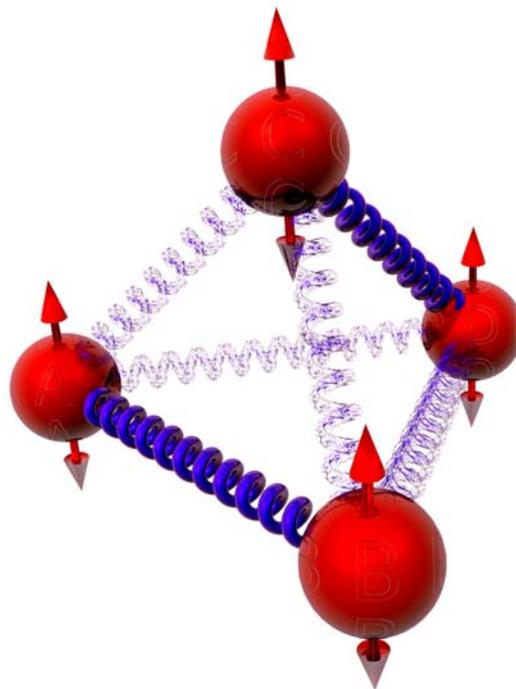


Experimental four-qubit bound entanglement

Elias Amselem (PhD student in Physics) and Docent Mohamed Bourennane, Swedish research council senior researcher in quantum information, physicists at Stockholm University observe for the first time four-qubit bound entanglement.

Entanglement is one of the most puzzling features of quantum theory and of great importance for the new research field of quantum information. Being a peculiar form of entanglement, bound entanglement emerges in certain mixed quantum states. This form of entanglement is not distillable by local operators and classical communication. Bound entangled states are different from both the free entangled (distillable) and separable states. They report for the first time on the experimental evidence of the existence of bound entangled state, the so-called Smolin state, and fully characterize it using quantum state tomography and study its entanglement properties using the separability criterion, the Bell inequality, and the witness method. In addition, they experimentally demonstrate the unlocking entanglement (distillation) protocol where if two of the four parties sharing the bound entangled state join and help other parties to share a maximally entangled state as they report in *Nature Physics*, volume 5, No 10, pp 748-752, October (2009). These properties make the bound entangled state useful for novel multiparty quantum communication schemes, for example, secret sharing, communication complexity reduction, and remote information concentration. They believe that results reported will contribute to deeper understanding of foundations of quantum mechanics.



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See also the News and Views about our work by Prof. Antonio Acin

Entanglement: Entangled and bound

Antonio Acin
Nature Physics, volume 5 No 10, pp 711-712, October (2009).
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