17 January 2008

By: Gabriel Gache, Science News Editor

Lasers bring further advances into quantum computing wikipedia.org

Quantum Computing Takes Giant Leap

Scientists improve the odds of observing critical Fano effect

Heisenberg's uncertainty principle states that while trying to determine the exact position of a particle in a small region of space, the momentum of the respective particle becomes uncertain and vice versa, by determining the momentum of the particle its location becomes uncertain. This property of the nanoscale systems usually prohibits the observation of the interactions which take place between atoms and molecules.Learning about the processes which take place at the nanoscale levels represents a important factor while trying to manipulate nanoscale devices into constructing quantum communication and computing structures. One of the most important effects that takes place in quantum systems, such as atoms and molecules, is the Fano effect which occurs when a quantum state interacts with a vacuum. This would ultimately alter the way the respective quantum system responds to the actions of electromagnetic radiation.The uncertainty principle may occasionally disable the possibility of observing quantum phenomenons such as the Fano effect. Nevertheless, a team of scientists from the Center of NanoScience at the Ludwig-Maximilian University in Munich decided to try new methods, which would increase the odds in detecting the interactions produced by the Fano effect.The experiment led by M. Kroner and K. Karrai used a laser with increasing light intensity in order to diffuse photons on the surface of a quantum dot by saturating it with photon particles. During this process, the team was successful in observing the critical Feno effect produced by weak interactions.Sasha Govorov from the Ohio University declared that this novel experiment would enable the detection of the nonlinear Feno effect at nanoscales and could be used in future applications that require observations of a system that presents relatively weak interactions. Furthermore, previous experiments that were using highly coherent light sources ,such as lasers, could be revisited in order to see if the Fano effect still applies.