Serge Haroche Awarded 2012 Nobel Prize in Physics

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French scientist Serge Haroche and his American counterpart David Wineland were named winners of the 2012 Nobel Prize in Physics by the Royal Swedish Academy of Sciences.

Mr. Wineland and Mr. Haroche, both 68, are being honored for their work in “quantum optics,” a field that explores the use of basic units of light and matter.

Mr. Haroche, from France’s prestigious École Normale Superieure (ENS), and David Wineland, of the National Institute of Standards and Technology (NIST) in Boulder, Colorado, have been awarded the distinction for “ground-breaking experimental methods” that lead to the development of laser-cooled atomic clocks, quantum computers, and event encryption decoders.

Serge Haroche began his career at the CNRS (French National Centre for Scientific Research) and has been a professor at the Collège de France since 2001 and works at the Kastler Brossel Laboratory (ENS/UPMC/CNRS/Collège de France - UMR8552)

Scientists project that Mr. Haroche and Mr. Wineland’s work could lead to significant advancements in communication and computation.

The Nobel Laureates have opened the door to a new era of experimentation with quantum physics by demonstrating the direct observation of individual quantum particles without destroying them. For single particles of light or matter the laws of classical physics cease to apply and quantum physics takes over. But single particles are not easily isolated from their surrounding environment and they lose their mysterious quantum properties as soon as they interact with the outside world. Thus many seemingly bizarre phenomena predicted by quantum physics could not be directly observed, and researchers could only carry out thought experiments that might in principle manifest these bizarre phenomena.

Through their ingenious laboratory methods Haroche and Wineland together with their research groups have managed to measure and control very fragile quantum states, which were previously thought inaccessible for direct observation. The new methods allow them to examine, control and count the particles.

Their methods have many things in common. David Wineland traps electrically charged atoms, or ions, controlling and measuring them with light, or photons.

Serge Haroche takes the opposite approach: he controls and measures trapped photons, or particles of light, by sending atoms through a trap.

Mr. Haroche and Mr. Wineland’s work may pave the way for “quantum computers” capable of complex

operations to further study in the field.

- **Download the official press release** from the Royal Swedish Academy of Sciences: http://www.nobelprize.org/nobel_prizes/physics/laureates/2012/press.pdf

- **Comments from the French Minister of Higher Education and Research** (French, with English subtitles):

- Video from the CNRS: Serge Haroche, an Explorer of the Quantum World (French)