Claude Cohen-Tannoudji

1997 NOBEL PRIZE IN PHYSICS
Collège de France and École normale supérieure
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Using light for manipulating atoms

Understanding the nature of light and its interactions with matter has always been a challenge for Physics. New concepts have emerged from these investigations, such as the wave particle duality. New mechanisms for the generation of light have been discovered, leading to the realization of new light sources, called "lasers", with remarkable properties. It has been also realized that light is not only a source of information on atoms but also a tool for manipulating atoms, for controlling their polarization, their position and their velocity, This has opened the way to a wealth of applications like optical pumping, magnetic resonance imaging, ultra-precise atomic clocks, atomic interferometers, Bose Einstein condensates. This lecture will describe in a simple way how these developments having occurred during the last few decades. It will be also shown how advances of fundamental research can open the way to new unexpected applications which transform our daily life.

BIO

Claude Cohen-Tannoudji is a French physicist born in Constantine (Algeria). In 1962, he completed his PhD in 1962 at the École normale supérieure (ENS) in Paris. In 1960, he joined the Centre National de la Recherche Scientifique (CNRS), a connection he maintained until 1964 when he was appointed Professor at the University of Paris. In 1973, he was elected Professor of atomic and molecular physics at the Collège de France in Paris, a position he held for many years. Prof. Cohen-Tannoudji's teaching experience led him to publish several textbooks, which are appreciated by undergraduate and graduate physics students. He pioneered the research into the various mechanisms that can be used to slow down, cool and trap atoms with a laser beam. Cohen-Tannoudji and his team, were among the first to cool atoms to very low temperatures, lower than one millionth of a degree above absolute zero. The techniques designed by Cohen-Tannoudji and other scientists have resulted in various specific applications, such as more accurate atomic clocks and more precise atomic interferometers and gyrometers to measure the force of gravity and a rotation speed. These techniques have also been essential for producing new states of matter like Bose-Einstein condensates. Prof. Cohen-Tannoudji has received many distinctions, among them the 1997 Nobel Prize in Physics shared with Steven Phillips and Steven Chu for the development of methods to cool and trap atoms with laser light.