Berthold Leibinger Stiftung GmbH, P.O. Box, 71252 Ditzingen, Germany

Berthold Leibinger Innovationspreis
Press Contact: Nicole Mann
Tel: +49 (0)7156 / 303-5204
Fax: +49 (0)7156 / 303-208
innovationspreis@leibinger-stiftung.de

PRESS RELEASE

Berthold Leibinger Zukunftspreis

Prof. H. Jeffrey Kimble
California Institute of Technology
Pasadena, USA

From Quantum Electrodynamics to Information Technology

The experimental and theoretical work of Professor H. Jeffrey Kimble in the field of cavity quantum electrodynamics has formed an essential foundation for quantum information technology, which may be considered a key technology of the 21st century. In conjunction with micro- and nanotechnology, powerful new technical possibilities emerge for the processing and distribution of information, including the quantum internet and quantum computing that could revolutionize information technology. Jeffrey Kimble has been awarded the 2006 Berthold Leibinger Zukunftspreis for his groundbreaking experiments in the field of cavity quantum electrodynamics.

Professor Kimble has spent his career researching the delicate interplay of atoms and photons. The phenomena that arise from the non-linear interactions between individual atoms and single light quanta (or photons) have long been considered the playthings of theoreticians. Kimble's invaluable work consists of not only having demonstrated many of these phenomena through actual experiments, but also in transforming fundamental physical processes into scientific tools for building new technological capabilities. In changing his focus from pure quantum mechanics to the second "quantum revolution," Kimble kept asking the question: How can basic quantum phenomena be harnessed to create new scientific possibilities and technical capabilities? Few scientists have done more for the transformation of abstract theoretical ideas into real laboratory implementations with tangible applications to the technologies of the future than has Jeffrey Kimble.

Professor Kimble's research is at the forefront of a revolution that has taken place over the past decade with the creation of new non-linear interactions between single atoms and photons. A distinguishing feature of this work has been the realization of completely new capabilities in a manifestly quantum domain that has propelled optical science into a previously unexplored realm for fundamental investigations of the interaction of light and matter. Kimble's contributions to this

Berthold Leibinger Stiftung GmbH, P.O. Box, 71252 Ditzingen, Germany

Berthold Leibinger Innovationspreis
Press Contact: Nicole Mann
Tel: +49 (0)7156 / 303-5204
Fax: +49 (0)7156 / 303-208
innovationspreis@leibinger-stiftung.de

revolution have been enabled by a decades-long quest to achieve strong coupling within a rather esoteric setting, namely that of cavity quantum electrodynamics (QED). The core of the experimental setup is a precision micro-cavity with micrometer spacing that confines a single photon and a single atom. A major milestone for his work was the demonstration in 1995 of a quantum phase gate for two beams of light. Roughly speaking, he and his colleagues achieved a quantum transistor with single photons, which had properties suitable for the implementation of quantum logic and perhaps ultimately for the construction of quantum computers. More recently, Kimble and his colleagues realized a laser that operates with one single atom and emits photons one by one.

Title of Work:
Cavity Quantum Electrodynamics

Digital pictures of the prize winners and the awarded work are available at www.leibinger-stiftung.de.