MAX PLANCK INSTITUTE
OF QUANTUM OPTICS

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Press Release

Professor Ignacio Cirac receives Hamburg Prize for Theoretical Physics

Professor Ignacio Cirac, Director at the Max Planck Institute of Quantum Optics (Garching, near Munich) and head of the Theory Division, has received the "Hamburger Preis für Theoretische Physik" (Hamburg Prize for Theoretical Physics) from the Joachim Herz Foundation. The prize honours his research work in the fields of quantum information theory, quantum optics and quantum many body systems. On the basis of quantum mechanics his investigations are leading to new concepts for quantum computers – devices based on a system of quantum particles that serve to store and encode information.

"Associated with this prize are research and teaching visits of Professor Cirac in Hamburg. This way the prize will not only increase research possibilities at this location but also support the exchange of young scientists", says Petra Herz, CEO of the Joachim Herz Foundation.

"Frontiers in Quantum Photon Science", a state excellence cluster which is supported by the Joachim Herz Foundation, established the prize in 2010. In cooperation with the federal excellence cluster CUI (Hamburg Centre for Ultrafast Imaging) at the Universität Hamburg, the Herz Foundation continued this assignment. The official ceremony will take place during the scientific colloquium of the CUI on November 12, 2015 on the research campus in Hamburg.

At the centre of Prof. Cirac's research is the development of a new information theory based on the laws of quantum mechanics. New ways of controlling the world of atoms, molecules, and photons are being explored in order to exploit their quantum mechanical properties for storing and communicating quantum information with high efficiency and security. This is basis for the development of quantum computers. The Theory Division of Prof. Cirac has developed new concepts for logical elements such as quantum gates that have already been implemented by experimental physicists.

The methods developed by his group do not only effect the field of quantum computer, but they are also important in other research areas, e.g. the theoretical research on the simulation of the behaviour of quantum many-body systems with ultracold atoms in optical lattices. "This is another reason, why his visit to Hamburg is of such a great importance. His developments can be adapted to many areas", says Prof. Dr. Peter Schmelcher, head of the "Theory Group of Fundamental Processes in Quantum Physics" at the "Zentrum für optische Quantentechnologien" in Hamburg.

Prof. Dr. Klaus Sengstock, head of the jury and speaker of the CUI, adds: "We are looking very much forward to Prof. Cirac's visit. His research work in the field of quantum information theory and his methods in the area of quantum many-body systems with ultracold atoms could lead to a better and deeper

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understanding of the properties of macroscopic solid matter. Certainly, there will be many more interesting topics for common research here in Hamburg."

Information on the person:

Professor Ignacio Cirac was born in the City of Manresa in 1965. He studied theoretical physics at the Universidad Complutense de Madrid where he received his PhD in 1991. He began his career in physics as a "Professor Titular" at the Universidad de Castilla-La Mancha where he stayed till 1996. In 1996 he became Professor at the department of Theoretical Physics at the University of Innsbruck. Here he continued his intense scientific collaboration with Professor Peter Zoller. Since 2001 he is Director at the Max Planck Institute of Quantum Optics and head of the Theory Division.

Professor Ignacio Cirac is a world-expert in the field of quantum information and quantum computation. In 2005 he was awarded the "Quantum Electronics Prize" of the European Science Foundation. In May 2006 he was the youngest ever winner of the renowned Royal Spanish Prince of Asturias Prize, and in the same year he received the International Quantum Communication Award together with Professor Peter Zoller. In 2009 he shared the "Frontiers of Knowledge Award in Basic Sciences" of the Spanish BBVA Foundation as well as the Benjamin Franklin Medal of the Franklin Institute in Philadelphia (USA) with Professor Peter Zoller. In January 2013 he received both the Israeli Wolf Prize and the Niels Bohr Medal. Last year, Prof. Cirac received the Honorary Doctor from the University of Zaragoza, in 2015 he got the Honorary Doctor from the University of Valencia and from the Universitat Politècnica de València.

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