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Press Release

Prof. Ignacio Cirac is elected ordinary member of the Royal-Spanish Academy of Sciences

Professor Ignacio Cirac, Director at the Max Planck Institute of Quantum Optics (Garching, near Munich) and head of the Theory Division, will be accepted to the Royal-Spanish Academy of Sciences as an ordinary member in a ceremonial act on 25 May, 2016. The statute dictates that the Academy is composed of exactly 54 Full Members, and Prof. Cirac will occupy the number 53. Under the chair of Prof. Alberto Galindo Tixaire, Prof. Ignacio Cirac will give his inaugural lecture “On the difficulties of solving many-body problems in quantum physics” at the academy on Wednesday evening.



A forerunner of the modern Academy of sciences was founded in 1582, during the reign of King Philip II. At that time the upcoming military and mercantile navigation as well as other applications asked for the development of mathematical tools, and the handling of mathematical problems had gained significant importance. After several closings and re-openings due to political changes the *Academy of Mathematics, Physics and Natural Sciences* was created by Royal Decree in Madrid in 1847. Today, the Academy plays an important role as it speaks for the science in Spain and advises the government in political decisions concerning scientific issues. (Photo: Thorsten Naeser)

A strong focus of Prof. Cirac's research is the simulation of the behaviour of quantum many-body systems with ultracold atoms in optical lattices. For example, such systems can serve as models for solid states crystals. This work will lead to a better understanding of macroscopic phenomena such as magnetism and superconductivity, but it also aims to get a deeper understanding about the true nature of light and matter.

At the centre of Prof. Cirac's research is also 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 ever higher efficiency and security. These investigations are leading to new concepts for future quantum computers. The Theory Division of Prof. Cirac has for example developed new concepts for logical elements such as quantum gates that have already been implemented by experimental physicists. Furthermore, the group develops new algorithms for quantum communication, designs new quantum networks making use of the special properties of quantum particles, and creates new theoretical tools to characterize and quantify e.g. entanglement of remote quantum systems.

**Press &
Public Relations**
Dr. Olivia Meyer-Streng

Phone:
+49 - 89 / 32 905-213
E-mail: olivia.meyer-streng@mpq.mpg.de

Hans-Kopfermann-Str. 1
D-85748 Garching

Phone: +49 - 89 / 32 905-0
Fax: +49 - 89 / 32 905-200

Information on Ignacio Cirac:

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. 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 (University of Innsbruck). 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. In 2014, Prof. Cirac received the Honorary Doctor from the University of Zaragoza. In 2015 he got the Hamburg Prize for Theoretical Physics.
Olivia Meyer-Streng

Contact:**Prof. Dr. J. Ignacio Cirac**

Professor of Physics, TU München
Director at the Max Planck Institute of Quantum Optics
Hans-Kopfermann-Straße 1, 85748 Garching, Germany
Phone: +49 (0)89 / 32 905 -705 /-736
Telefax: +49 (0)89 / 32 905 -336
E-mail: ignacio.cirac@mpq.mpg.de
www.mpq.mpg.de/cirac