

March 4, 2005
IQOQI Media alert 2/2005



Forging links between different specialisms

Innsbruck physicist Peter Zoller to receive the Max Planck Medal

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On March 6, 2005, Innsbruck physicist Peter Zoller will receive the Max Planck Medal for his outstanding contributions to quantum optics and quantum information. German Chancellor Gerhard Schröder will present the Austrian scientist with the prestigious award for theoretical physics at the AGM of the Deutsche Physikalische Gesellschaft in Berlin.

The award recognizes Peter Zoller's major work on the interaction of laser light with atoms. "The real achievement was linking knowledge from different fields," explained Zoller. "Nuclear physics and quantum optics have made great progress at the level of experiments. Our contributions have not been confined to fundamental developments in quantum optics. Equally important has been forging a link with quantum information and solid state physics." The model of a quantum computer proposed by Peter Zoller and Ignacio Cirac, currently head of the theory group at the Max Planck Institute in Munich, is based on the interaction of lasers with cold ions stored in an electromagnetic trap. The model was published ten years ago. In recent years scientists in Innsbruck and elsewhere have succeeded in realizing the main assumptions of the model in the lab. It is one of the most promising approaches to building a scaleable quantum computer. "We are always thinking years ahead", Zoller stressed. "The major challenge lies in identifying key objectives in physics that go beyond your own specialist field, for instance the implementation of quantum computers or quantum communication, and to develop theoretical concepts that may be realized in the lab with existing or soon to be developed technology." Zoller is particularly well suited for this task: he may be a theoretician but he is in close contact with experimental physicists and knows a lot about the experiments and the possibilities that they hold. "I have a pretty good idea of where the experimental physics of our quantum community stands at the moment and what possibilities it offers. This is a good point from which to start conceiving new approaches," Peter Zoller explained.

He has also been able to forge links between quantum optics and solid state physics, for instance in the area of "strongly correlating systems" such as high temperature superconductors. Their physical

mechanisms are unknown, not least because theoreticians cannot fully solve the related models since this task outstrips even the capability of high performance computers. To get at the root of these phenomena Zoller has suggested building a quantum simulator of cold atoms from Bose-Einstein condensates, de facto a highly specialized quantum computer. That this proposal has already been realized in part is one of many successful outcomes of the intensive cooperation of a group of scientists made up of professors, post-docs and students. "In accepting this prestigious award I see myself as the representative of a team", Peter Zoller emphasized who is happy to share this recognition with his colleagues.

Scientist of world renown

Peter Zoller has a chair at the University of Innsbruck and, as scientific director, heads a working group at the Institute for Quantum Optics and Quantum Information (IQOQI) of the Austrian Academy of Sciences (ÖAW). His theoretical work is years ahead of its experimental realization and attracts worldwide interest before eventually being realized in laboratories. Zoller, born 1952 in Innsbruck, studied physics there, got his doctorate in 1977 and his *venia legendi* in 1980. He has been guest professor in numerous university of world renown and has been offered a chair by the University of Ulm, Germany, the University of Colorado in Boulder and by Harvard University, to name but a few. For several years Peter Zoller had a professorship at the Joint Institute for Laboratory Astrophysics (JILA) in Boulder before taking up a chair at the University of Innsbruck in 1994. In 1998 he received the Wittgenstein Prize of the Austrian Science Fund FWF, the highest Austrian accolade for scientists. In the same year he was awarded the Schrödinger Prize and the Max Born Prize of the Optical Society of America. In 2002 the federal state of Tyrol acknowledged Zoller's work by awarding him the Tiroler Landespreis für Wissenschaft. Since 2001 he has been a full member of the Austrian Academy of Sciences.

The Deutsche Physikalische Gesellschaft (DPG) goes back to the year 1845 and is the oldest and – with more than 47,000 members – the largest association of physicists in the world. Since 1929 it has awarded the Max Planck Medal annually. Previous recipients include famous names such as Max Planck himself as well as Nobel Prize winners Albert Einstein, Niels Bohr, Werner Heisenberg, Erwin Schrödinger and Wolfgang Pauli.

We are happy to provide pictures of Prof. Peter Zoller on request.

We can send you pictures of the award ceremony in Berlin on request.

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