

The 2nd Dvořák Lecture

By Professor Anton Zeilinger, University of Vienna, Austria

Quantum Information and the Foundations of Quantum Mechanics

June 23, 2010 at 3:00 pm

Institute of Physics of the AS CR, v. v. i., Na Slovance 2, CZ-182 21 Praha 8, Czech Republic

Annotation

Research on the foundations of quantum mechanics has given rise to the field of quantum information science. It should be stressed that this research beginning around the 1970s was not motivated by search for applications but rather by pure fundamental curiosity. Today, quantum computation, quantum teleportation, quantum communication, or quantum cryptography are novel concepts in information technology with no classical parallel. The resulting experimental development in quantum information science has renewed the debate about the foundations of quantum mechanics and it has led to unprecedented

control of quantum systems. All this again opens up the door for novel fundamental experimental research directions. For example, the high-precision control of entangled photon states even over distances as large as those between the two Canary Islands of Tenerife and La Palma allows novel tests of the concepts of nonlocality and realism. Or, to mention another example, the development of quantum microoptics opens up new experiments in higher-dimensional Hilbert spaces. Such experiments in turn will again give rise to novel possibilities in quantum information science.



Anton Zeilinger

Born 1945, after studying and defending his thesis at the University of Vienna in 1971 and habilitation in 1979 at TU Vienna he became associate professor at M.I.T. and TU Vienna. In years 1988–1989 he took a professor position at TU Munich and 1990–1999 professor position at the University of Innsbruck. Presently he is a professor of experimental physics at the University of Vienna (since 1999) and scientific director of the Institute

of Quantum Optics and Quantum Information, Austrian Academy of Sciences in Vienna. Distinguished member of many Learned Societies, important councils and advisory committees. Author of more than 300 publications in recognized journals, more than 700 invited talks at conferences at workshops.

His main scientific achievements include quantum information, quantum communication and quantum computation, he has made important contributions to fundamental physics of entangled photons, atom and molecular optics, mesoscopic physics, etc. Awarded many times with international prizes and awards e.g. the Descartes Prize (European Commission), the Great Cross of Merit with Star of the Federal Republic of Germany, the Wolf-Prize in Physics (Wolf Foundation, Israel).



Vladimír Dvořák (1934–2007)

Solid state physicist, the most prominent Czech scientist in the theory of ferroelectricity and structural phase transitions, for the whole productive life affiliated with the Institute of Physics, Acad. Sci. Czech Rep. in Prague, its director in 1993–2001, member of the Learned Society since 1995. The main protagonist of the revolutionary reforms in the Institute of Physics after 1989.

His main achievement was a progress in the theory of improper ferroelectrics and incommensurate phase transitions achieved by a generalization of the group formulation of the Landau theory of phase transitions. For years he would be one of the most cited and internationally renowned scientist of the Institute. His personality has strongly influenced the scientific program and development in the Department of Dielectrics of the Institute since the late sixties up to present. Brilliant lecturer and most respected director of the Institute.

To commemorate his work and personality, the Institute of Physics of the Academy of Sciences of the Czech Republic decided to organize an annual festive Dvořák lecture, given by prominent internationally renowned scientists in the field related to the research pursued at the Institute of Physics.



Fyzikální ústav
Akademie věd ČR, v. v. i.