# KOÇ UNIVERSITY

# Science – Math Seminar

**Speaker:** Arno Bohm
Professor of Physics,
Department of Physics,
University of Texas at Austin

**Date:** Tuesday, Dec. 28, 2004
**Time:** 16:45 (Tea and cookies will be served at 16:15, at the lounge in front of Room SCI Z42)
**Place:** CAS B07
**Title:** Causal Quantum Theory

## Abstract:

Standard quantum mechanics only provides an approximation (Weisskopf-Wigner) for resonance and decay phenomena, because no consistent theory is possible within the conventional axioms. Modifying the axiom that specifies the boundary conditions of the dynamical (Schrodinger or Heisenberg) equations will lead to a new, exact quantum theory.

**Contents:**
- Brief introduction to Quantum Mechanics – Semigroups
- Brief introduction to resonances and decay - Lifetime-width relation
- From the exponential law to Gamow vectors
- Unifying Breit-Wigner amplitude and Gamow vector
- Physical Interpretation of the semigroup evolution
- The new axiom of time asymmetric quantum theory
- Observing the beginning of semigroup time
- Experiments on individual Ba ions
- The exponential lifetime as the ensemble average  of individually observed lifetimes and the physical interpretation of the semigroup time t=0.

**Biographical Information:**

Arno Bohm is a professor of physics at the University of Texas at Austin. He is a member of the standing committee for the International Group Theory Colloquia and the chairman and founder of the Group Theory and Fundamental Physics Foundation which administers the

Wigner Medal (It was this foundation that awarded the Wigner Medal of the year 2004 to Professor Erdal Inonu.)

Professor Bohm's areas of research include group theoretical methods in particle physics, spectrum generating group, relativistic spectrum generating group and relativistic collective models, geometric phase and its applications in molecule physics, rigged Hilbert space formulation of quantum mechanics with applications to decay and Golden Rule, time evolution semigroup, and irreversible quantum theory.

Professor Bohm is the author of over 180 research publications including the following books.

- A. Bohm and M. Gadella, *Dirac Kets, Gamow Vectors, and Gel'fand Triplets*, Springer (1978); Second edition (1989).
- A. Bohm, *Quantum Mechanics: Foundations and Applications*, Springer, First edition (1979); Third edition, second printing (1994).
- A. Bohm, A. Mostafazadeh, H. Koizumi, Q. Niu, and J. Zwanziger, *The Geometrical Phase in Quantum Systems,* Springer (2003).

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Please visit http://sci-math.ku.edu.tr/ for a schedule of upcoming Science - Math seminars.