



KOÇ UNIVERSITY

## Science – Math Seminar

**Speaker:** Zafer Gedik  
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**Date:** Thursday, May 26, 2005  
**Time:** 16:45 (Tea and cookies will be served at 16:30)  
**Place:** Science Building, Room Z42

**Title:** Quantum Zeno Effect and Schrödinger's Cat in Spin Environment

### Abstract:

In 1977 Misra and Sudarshan [1] proposed what they called the quantum Zeno effect as an experimental demonstration of the collapse of the wave function. Their idea was to subject a system to repeated measurements. They showed that a continuously observed unstable system never decays, reminiscent of the adage attributed to Zeno of Elea: "A watched pot never boils". Quantum Zeno effect might provide an important ingredient for quantum computing experiments. In this talk we will first introduce the concept of pointer states and environment-induced superselection or einselection. We will explain the relation between this quantum process, associated with selective loss of information, and the Schrödinger cat states. We are going to demonstrate the Zeno effect by means of an exactly solvable model of decoherence where a central spin or qubit interacts with a collection of environment spins. We will generalize this model to include successive observations and show that for sufficiently fast measurements the central spin remains coherent.

[1] B. Misra and E.C.G. Sudarshan, *J. Math. Phys.* **18**, 756 (1977).

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