

# Sommerfeld Theory Colloquium

**Wednesday, 13<sup>th</sup> July 2005**  
at 11.15 h  
room 349, Theresienstr. 37 / III

**Dr. Paolo Zanardi**  
**ISI, Torino**

## Fighting quantum decoherence with symmetries

Defending coherence of a quantum processing device against the environmental interactions is a vital goal for any foreseeable practical application of Quantum Information and Quantum Computation theory. I will show how a suitable use of the symmetries -present from the outset or dynamically enacted- of the system-environment interactions may allow one to single-out sectors of the quantum state-space that are largely immune to noise. These latter, known as decoherence-free subspaces or noiseless subsystems, then represent ideal places where quantum information can be stored and manipulated in a safe way without resorting to expensive active error-correction techniques.