### Arnold Sommerfeld



http://www.asc.physik.lmu.de asc@theorie.physik.uni-muenchen.de Ludwig Maximilians– Universität München



Department für Physik Theresienstr. 37 D-80333 München Germany

Tel: +49-89-2180 4378 Fax: +49-89-2180 4186

# 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.