PHYSIKALISCHES KOLLOQUIUM

AM 11. JUNI 2012 UM 17 UHR C.T.

IM GROßEN HÖRSAAL

DOES GOD PLAY DICE?

PD DR. MICHAEL WALTER

FREIBURGER MATERIALFORSCHUNGSZENTRUM

UNIVERSITÄT FREIBURG

The non-relativistic time dependent Schrödinger-equation is completely deterministic. The solutions of this first order differential equation are determined by their initial value. Only at events of measurements there is a sudden jump of the state vector into one of the eigenstates of the measurement apparatus with random probability. This apparent contradiction leads to paradoxes like well known "Schrödingers cat" problem and is connected to the cloudy definition of the measurement.

I will review some of the ideas on the market how to solve the problems of the random jumps in quantum mechanics and how the everyday experience of the absence of quantum superpositions might be explained. Without being able to give a final answer, I nevertheless invite you to follow me "down the drain, into a blind alley from which nobody has yet escaped."*

*Richard Feynman, The Character of Physical Law (1965) Lecture 6: Probability and Uncertainty - the Quantum Mechanical view of Nature