Talk of **Maurice de Gosson** (Vienna)

Title:
What happens if Planck's constant changes?

Abstract:

The variability of physical "constants" is a possibility that cannot be outruled and which is an active area of research in cosmology and astrophysics. In fact, since Dirac in his "Large Numbers Hypothesis" suggested that some constants of Nature could vary in space and time, the topic has fascinated not only physicists but also philosophers of Science, and has motivated numerous theoretical and experimental researches. In this talk we focus on some consequences of possible changes in Planck's constant. In particular, the purity of a quantum state is extremely sensitive to such changes, and quantum states can evolve into classical states, and vice versa. We also shortly discuss entanglement from this perspective. A complete classification of such transitions is however not possible for the moment being because of yet unsolved mathematical difficulties related to the study of positivity properties of trace class operators. Reference: M. de Gosson, *Phys. Lett. A* **381** (2017).