Contribution ID: **38** Type: **not specified**

Symmetry aspects in emergent quantum mechanics

Friday, 12 December 2008 18:55 (20 minutes)

There is an energy-parity symmetry hidden in the Liouville equation, which resembles the one proposed recently by Randall and Sundrum as protective symmetry for the cosmological constant. We argue heuristically that this symmetry should be broken due to the coarse-graining which is inherent in physics, say, of the Standard Model, when the fundamental scale related to spacetime is the Planck length. It is shown that a correspondingly modified classical ensemble theory, incorporating information loss, quite generally leads to quantum mechanics, in the form of the von Neumann equation for density matrices. Thus, the emergence of quantum phenomena may be tied to attractive fixed point behaviour that arises in the statistical mechanics of classical objects, if and when not all data characterising their situation are experimentally accessible.

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Session Classification: Parallel Session C. Entanglement

Track Classification: Entanglement, Symmetrisation Principle