Contribution ID : **82** Type : **plenary talk**

Can strong quantum correlations of entangled K-mesons be experimentally tested?

Saturday, 31 May 2014 09:00 (0:30)

Collaboration

Abstract content

This talk will present a proposal for a first conclusive experimental test of revealing correlations that are stronger than those allowed by classical physics [1]. Surprisingly, in a certain setup the tiny difference between a world of matter and a world of antimatter, the famous violation of the CP symmetry (C – charge conjugation; P – parity), becomes responsible for the possibility of revealing these strong quantum correlations. Hence, a relation between entanglement and symmetry violations in Particle Physics is established that is even more puzzling since the symmetry violation in weak interactions links to the unsolved problem of why we live in a universe dominated by matter. Neutral mesons are naturally oscillating systems as are neutrinos or chiral molecules. Therefore, they qualify for studying precisely the quantum superposition, i.e. via decoherence models or collapse models. Collapse models provide a concise mathematical framework for modelling how a classical world emerges from quantum mechanics. Its dynamics preserves (practically) quantum linearity for microscopic systems whereas when moving towards macroscopic scales it becomes strongly nonlinear and provides new physical predictions for the region in between. Are collapse models testable with mesons, neutrinos or chiral molecules? [2]

[1] Hiesmayr et al., European Physical Journal C 72, 1856 (2012). [2] Bahrami et al., Nature: Scientific Reports 3, 1952 (2013).

Primary author(s) : HIESMAYR, Beatrix C. (University of Vienna)

Presenter(s) : HIESMAYR, Beatrix C. (University of Vienna)

Session Classification : Plenary Session