A test of EPR correlations in B0-B0bar pairs at the Belle experiment

The quantum-mechanical phenomenon of *entangled states* --- states which cannot be described as a product of states of the parts of the system --- is counter-intuitive. Einstein, Podolsky, and Rosen's famous objection to entanglement sharpened the discussion of the interpretation of quantum mechanics, which continues to this day.

Sources of entangled pairs of photons, violating the Bell inequalities and thus inconsistent with any local hidden variable theory, are now very well established, and a matter of engineering - as much as physics-research. Entanglement in other physical systems is less well studied. In this talk I will present a study of EPR correlations between pairs of neutral B-mesons, by the Belle experiment at the KEKB e+e- collider in Tsukuba, Japan. The KEKB/Belle facility is designed to study violations of the CP symmetry in B-meson decays, and analyses of its data normally take for granted the time evolution predicted by quantum mechanics. In the study presented here we invert this approach, and use flavour-specific decays to measure the time evolution of B-meson pairs prepared in a flavour-entangled state. We compare the results with predictions from quantum mechanics and several local realistic models.