

Measurement of the KS lifetimes and CPT symmetry tests in the neutral kaon system with quantum interferometry at KLOE

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A phi-factory offers the possibility to select pure kaon beams: neutral kaons from $\phi \rightarrow K_S K_L$ are in fact produced in a well defined state ($J^{PC}=1^-$) and the detection of a kaon at large (small) times tags a K_S (K_L). This allow to perform precise measurement of kaon properties, as for example lifetime, and to study time evolution of neutral kaon system. In particular, studying the distribution of Δt , the difference between the two neutral kaon decay times, where both kaons decay into $\pi^+\pi^-$ pair, provides unique opportunities for testing quantum mechanics and CPT symmetry.

Using the full 2004-2005 data sample ($L=1.5 \text{ fb}^{-1}$) collected with the KLOE detector at the Frascati-DAΦNE e^+e^- collider,

we discuss very recent update of the results testing the validity of quantum mechanics and CPT invariance.

Then, we are presently finalizing the determination K_S lifetimes using $\sim 1/3$ the whole KLOE data set, where the proper time distribution of $K_S \rightarrow \pi^+\pi^-$ provides a competitive measurement of lifetime.

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