

Seminarium Studium Doktoranckiego NCBJ

Thursday, 12 November, 9:00

<https://www.gotomeet.me/NCBJmeetings/phd-seminar>

Speaker:

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Title:

Feasibility Studies of CPT Violation Measurement in Flavour Oscillations of the Neutral D Meson

Abstract:

Mesons are bound quark-antiquark pairs. Flavoured neutral mesons are defined as mesons with no electric charge and non-zero strangeness, charm or beauty content. The weak interactions mix neutral-mesons with their antiparticles leading to spontaneous transitions between meson and antimeson quantum states, which can serve as a sensitive interferometer facilitating precision testing of CPT invariance.

The main objective of my master's thesis was to perform feasibility studies of the CPT violation (CPTV) measurement in the system of the neutral D meson. CPT symmetry is one of the fundamental symmetries of the Standard Model (SM). The measurement of CPTV would mean that there exists physics beyond the SM. My goal was to probe the level of sensitivity of testing CPTV in the system of the neutral D meson. For this purpose, I created a Monte Carlo

(MC) generator of neutral meson decays, where CPTV was controlled by a complex phenomenological parameter z .

The MC generator was used to simulate the CPT violation effect at the level of $z=0.1$ for an ensemble of 100 pseudo-experiments. Each experiment consisted of $N=6.5 \cdot 10^7$ of MC generated events corresponding to the number of $D^0 \rightarrow K^+\pi^-$ decays collected by the LHCb (2011-2012). For such statistics, the CPT violation effect would be seen at seven standard deviations level. This can be contrasted with the best experimental limit for the parameter z of order $O(1)$ provided by the FOCUS collaboration.