

Seminarium Szkoły Doktorskiej NCBJ

Thursday, 13 January, 9:00

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

Speaker:

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Title:

The physics case for the CP-violation tests in hyperon decays at SCTF

Abstract:

The observed matter-antimatter asymmetry in our universe can be explained theorizing the violation of the combined charge-conjugation–parity symmetry (CP), of which non-leptonic two-body weak decays of baryons are an important probe. We explain how and why the decays of strange baryons provide complementary information to the decays of kaons. We present a model-independent parameterization of the non-leptonic decays of the Λ - and Ξ -baryons produced at the at the next generation electron–positron J/ψ factories with luminosity of $10^{35} \text{ cm}^{-2} \text{ s}^{-1}$. Using analytic approximations and numerical calculations we study the quantitative impact of spin correlations and polarization in CP tests built from the produced, spin-entangled hyperon-antihyperon pairs.

We show that by using a longitudinally-polarized electron beam the statistical precision of the CP tests can be significantly improved. Furthermore, we map out further directions for possible improvements, like analysis of incompletely reconstructed events or a combination of the isospin related processes. Altogether these methods are promising for the observation of a statistically significant CP-violation signal with a strength corresponding to the standard model predictions. Finally, our results call for an update of the theory predictions with increased precision.