Contribution ID: **177** Type: **Poster**

Gravity induced CP violation in K and B mixing, decays and interferences experiments

Wednesday 9 July 2025 18:23 (20 minutes)

The impact of earth's gravity on neutral mesons dynamics is analyzed. The main effect of a Newtonian potential is to couple the flavor oscillations with the quarks zitterbewegung oscillations. This coupling is responsible of the observed CP violations (CPV) in the three types of experiments: (i) indirect violation in the mixing, (ii) direct violation in the decay to one final state and (iii) violation in the interference between decays with and without mixing. The three violations parameters associated with these experiments for K and B neutral mesons (epsilon, epsilon prime and beta : arXiv:2503.09465) are predicted in agreement with the experimental data (PDG 2024). The amplitude of the violation is linear with respect to the strength of gravity so that this new mechanism allows to consider matter dominated cosmological evolution providing the observed baryon asymmetry of the universe (BAU).

Secondary track

T01 - Astroparticles, Gravitation and Cosmology

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Session Classification: Poster T07

Track Classification: T07 - Flavour Physics and CP Violation