

Laboratoire de Physique des 2 Infinis

Gravity induced CP Violation in K and B mixing, decays and interference experiments JM Rax, IJCLab, Université de Paris-Saclay,

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CPV observables

 $Re(\varepsilon), Re(\varepsilon'/\varepsilon), Sin(2\beta)$

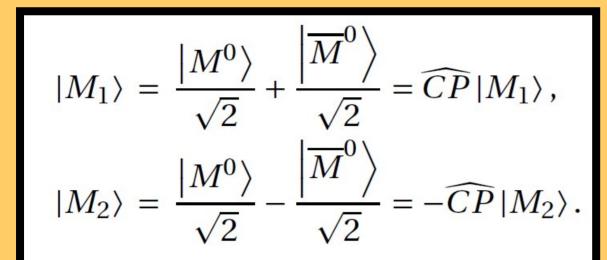
CPV experiments with neutral flavored mesons

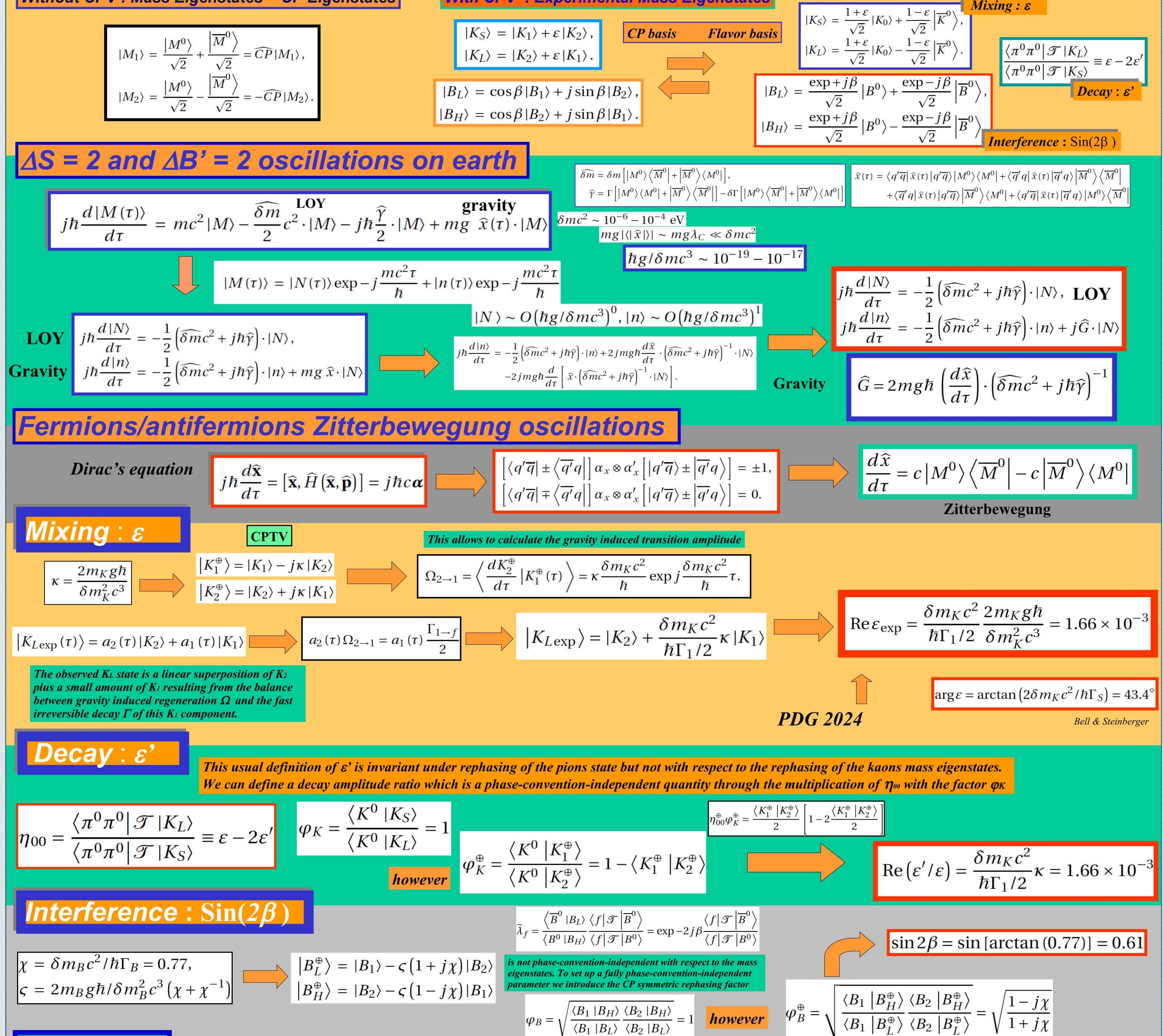
The impact of earth's gravity on neutral mesons dynamics is analyzed. The main effect of a Newtonian potential is to couple the strangeness and bottomness flavor oscillations with the quarks zitterbewegung oscillations. This coupling is responsible of the observed CP violations in the three types of experiments analyzed here : (i) indirect violation in the mixing, (ii) direct violation in the decay to one final state and (iii) violation in interference between decays with and without mixing.

The 3 violation parameters associated with these experiments are predicted in agreement with the experimental data. 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 evolutions providing the observed baryon asymmetry of the universe.

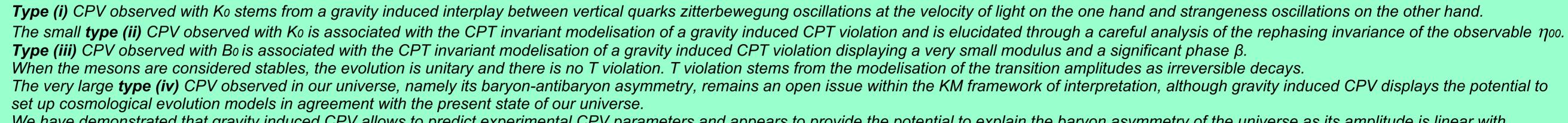
Without CPV : Mass Eigenstates = CP Eigenstates











 $\langle B_1 | B_L \rangle \ \langle B_2 | B_L \rangle$

We have demonstrated that gravity induced CPV allows to predict experimental CPV parameters and appears to provide the potential to explain the baryon asymmetry of the universe as its amplitude is linear with respect to the strength of gravity. This set of new results was obtained within the canonical framework of quantum mechanics, on earth, without any speculative assumption on new coupling, or new field, or new physics. From this clear convergence of results, we can conclude that a CKM matrix free of CPV phase is to be considered as the core of the SM in a flat Lorentzian environment far from any massive object like earth.



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