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Oscillations of density and coherence in field mixing

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We study the dynamics of particle mixing induced by their coupling to a common intermediate state or decay channel, which is of broad fundamental interest within the context of CP violation and/or baryogenesis. Field mixing may also be a consequence of "portals", connecting standard model degrees of freedom to hypothetical ones via mediator particles beyond the standard model. An effective equation of motion for the reduced density matrix of the two particle fields is derived to study evolutions of one-point and two-point correlation functions, in which a generalized fluctuation-dissipation relation is uncovered. When the two fields are nearly degenerate, we find a strong mixing of the two fields and prominent oscillations and quantum beats in Stoke' s parameters of the two fields. In the long-time limit, Stokes parameters show a non-zero correlation between the two fields.

Mini Symposia (Invited Talks Only)

Author: CAO, Shuyang (University of Pittsburgh)

Presenter: CAO, Shuyang (University of Pittsburgh)

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