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# Parametric resonance in abelian and non-abelian gauge fields via space-time oscillations

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Since the detection of gravitational waves, their interaction with different physical systems has been of interest. We study the phenomenon of parametric resonance of abelian(U(1)) and non-abelian(SU(2)) gauge fields in presence of oscillatory space-time background. Momentum analysis shows modes undergoing parametric resonance enhance small fluctuations initially present in the fields; which further results in increase of physical observables such as energy density, CP-violating E·B/$F\tilde{F}$, etc. Preliminary numerical simulations in 2+1 dimensions imply that apart from a color factor the growth of energy density in non-abelian gauge fields is similar to that of abelian gauge fields. Also, our results suggest that in the early universe gravitational waves may enhance CP violation resulting in chiral magnetic effects, enhance instanton transitions, production of particles etc. Local resonant mode of gauge fields, with zero CP violation initially, evolve to field configuration with non-zero CP.

## Session

Astroparticle Physics and Cosmology

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