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Particle production in intensive plane wave background

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We study the stability of an intensive plane wave of a massless (or small mass) field due to the production of massive particles (a process which is perturbatively forbidden), in a toy model of two scalar fields. We apply two methods: first, we solve the Heisenberg equation for quantum amplitudes of produced massive field in case of arbitrary masses generalizing the solution of (see A.Arza PRD 105 (2022) 3, 036004) applied to the case of small masses; and making the Lorentz boost (in case of nonzero mass) from the intense plane wave to intense oscillating condensate. The stability of the latter reduces to the stability of the Mathieu equation which is a well-known task. Comparing the results we argue that the generalized Arza solution is related to the case of narrow parametric resonance.

Primary author(s) :   DMITRIEVA, Ekaterina (INR RAS); SATUNIN, Petr (INR RAS)

Presenter(s) :   DMITRIEVA, Ekaterina (INR RAS)

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