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Photon Generation in a One Dimensional Oscillating Cavity with a Uniform Magnetic Field

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The vacuum of quantum electromagnetic field can be excited in the form of photon creation via the interaction with moving boundaries. This is so-called the dynamical Casimir effect. It is well known that the external magnetic field can result in the amplification of the quantum fluctuations of electromagnetic field. In the present work, we therefore consider photon creations from the dynamical Casimir effect in a one dimensional cavity between two parallel moving conducting plates with the presence of a uniform external magnetic field. Starting with the Euler-Heisenberg effective action, the quantum electromagnetic field operator is written as the expansion of mode functions, which are the classical solutions corresponding to the effective Lagrangian. By calculating Bogoliubov coefficients, the number of created photons is determined in the resonance condition. With the presence of a uniform magnetic field, photons are generated with larger amount than that in the case of no magnetic field.

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