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Contribution ID: **3177** Type: **Oral Competition (Graduate Student) / Compétition orale (Étudiant(e) du 2e ou 3e cycle)**

(G*) Schwinger pair production - from fall to infinity to fall to the centre

Monday 6 June 2022 11:00 (15 minutes)

The vacuum instability in the presence of a static electric field that creates charged pairs is termed as Schwinger pair creation. The classical field theory of Schwinger pair creation can be described using an effective Schr\"{o}dinger equation with an inverted harmonic oscillator (IHO) Hamiltonian which exhibits fall to infinity[1]. In this talk we demonstrate that the classical field theory of Schwinger pair creation has a hidden scale invariance described by the quantum mechanics of an attractive inverse square potential in the canonically rotated (Q, P) coordinates of the inverted harmonic oscillator. The quantum mechanics of the inverse square potential is well known for the problem of fall to the centre and the associated ambiguities in the boundary condition. The physics of inverse square potentials appears in various problems including, pair creation in the presence of an event horizon [3] and black hole decay, optics of Maxwell's fisheye lenses [4] and coherence of sunlight on the earth [5] etc. We use point particle effective field theory (PPEFT) to derive the boundary condition which describes pair creation. This leads to the addition of an inevitable Dirac delta function with a complex coupling to the inverse square potential, describing the physics of the source that runs in the.sense of renormalization group. The complex coupling gives rise to conservation loss or gain at the centre which is physically due to charged pairs being produced in Schwinger pair production.
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