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QED vacuum fluctuations as a function of magnetic moment[1]
JOHANN RAFELSKI, University of Arizona, LANCE LABUN, National Taiwan University — Precision QED experiments (muon $g-2$ and muonic protium Lamb shift) suggest closer examination of QED in the case $g > 2$. We evaluate the non-perturbative one-loop effective potential in a quasi-constant external electromagnetic field as a function of the magnetic moment. For $|g| > 2$, the lowest magnetic Landau levels become unstable, which is treated by recognizing periodicity of the Landau spectrum as a function of g. This instability leads to a cusp in the effective potential at the periodic points $g = 2, -2, 6, -6...$ Where the cusp is present, the beta function and light-light scattering coefficients differ from their perturbative values. We extract the nonperturbative form of the beta function as a function of g and show that QED displays asymptotic freedom for a specific range of g.

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