

Abstract Submitted
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Trace Anomaly in Strong Electromagnetic Fields LANCE LABUN,
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partment fuer Physik der Ludwig-Maximilians-Universitaet Muenchen und Maier-
Leibniz-Laboratory — Violation of the superposition principle in the Maxwell field
could arise from intrinsic nonlinearity in the fundamental theory of the photon, such
as seen in Born-Infeld (BI) electrodynamics, but certainly occurs due to charged par-
ticle vacuum fluctuations, i.e. one-loop quantum electrodynamics (QED). The nec-
essary presence of a dimensioned scale in a nonlinear theory induces a nonvanishing
trace in the energy-momentum tensor

$$T_{\mu}^{\mu} = -M \frac{dL_{\text{eff}}}{dM} = -4 \left(L_{\text{eff}} - \mathcal{S} \frac{\partial L_{\text{eff}}}{\partial \mathcal{S}} - \mathcal{P} \frac{\partial L_{\text{eff}}}{\partial \mathcal{P}} \right),$$

where \mathcal{S}, \mathcal{P} are the scalar and pseudo scalar field invariants. T_{μ}^{μ} has the form of the
Einstein cosmological constant, and hence intense electromagnetic fields generate a
localized, dark energy-like concentration.

References:

Trace Anomaly of Nonlinear Electrodynamics and its (Anti) Gravitational Effect
arXiv:0811.4467 [hep-th] and
QED Conformal Anomaly in External Fields arXiv:0810.1323 [hep-ph]

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