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Anharmonic Waves in Quantum Electrodynamics FRANZ HIMPSEL, Physics Dept., University of Wisconsin Madison — This work starts from the premise that a nonlinear interaction term in classical and quantum field theory generates harmonics, analogous to harmonic generation in nonlinear optical media. This calls for a generalization of the standard plane wave basis set to anharmonic waves. Three simple requirements are found that make anharmonic waves compatible with relativistic field theory and quantum physics [1]. The most general class of anharmonic waves allows for a zero frequency term in the Fourier series, which corresponds to a quantum field with a non-zero vacuum expectation value. Compatibility with standard quantum electrodynamics is demonstrated by generalizing the Feynman rules to anharmonic waves [2]. But anharmonic waves should be most useful for tackling intrinsically non-perturbative phenomena.

[1] F. J. Himpsel, arXiv:1108.1736v1 [hep-th] (2011).
[2] F. J. Himpsel, arXiv:1112.6216v1 [hep-th] (2011).

Franz Himpsel
Physics Dept., University of Wisconsin Madison

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