

Interacting alternatives to Maxwell's equations preserving conformal and duality invariance

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The source-free Maxwell's equations are both conformal invariant and invariant under an $SO(2)$ electromagnetic duality group. It is commonly thought that these conditions imply their uniqueness. However, there are two interacting electrodynamics theories with the same field content and all the symmetries of Maxwell's equations. One was found in 1983 by Bialynicki-Birula from a strong-field limit of Born-Infeld theory; it has an enhanced $SL(2;R)$ -duality invariance. The other, dubbed "ModMax", was found very recently from a weak-field limit of a 'generalized' Born-Infeld theory; it has a dimensionless coupling constant and reduces to Maxwell for zero coupling. This talk will review the main features of both Bialynicki-Birula and ModMax electrodynamics.

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