The Reaction Force of Emitted Radiation: A Comment on arxiv:1003.0247

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Abstract

The authors of [arxiv:1003.0247] neglect to consider that the source of radiation is an accelerated electron, that an emitted photon reacts, or pushes back, on the electron that releases it. This is a linear process, therefore a nonlinear Schrödinger equation is not applicable.

According to the authors of reference [1], a force, $F_{external}$, is applied to an electron. The electron moves and releases a photon. The photon's force is added to $F_{external}$. What's wrong with that?

The most glaring error is that the emitted radiation pushes back on the electron, so $F_{radiation}$ in fact works in a direction opposite to $F_{external}$.

But that is not the only problem. Another problem is that the effect of $F_{external}$ on the electron is not considered. What effect does $F_{external}$ have on the electron? The electron's rest mass energy is mc^2. When $F_{external}$ acts on the electron, the electron has to lose internal energy, manifested externally as radiation,

$$mc^2\left[1-\sqrt{1-v^2/c^2}\right]=hf \qquad (1.$$

This is a consequence of the action-reaction law,[2,3,4] which derives from

$$\frac{d}{ds}\left[\nabla^2\psi-\frac{1}{c^2}\frac{\partial^2\psi}{\partial t^2}\right]=0 \qquad (2.$$

It is immaterial whether derivatives are taken before or after the equation is solved: equation (2) accounts very well for the reaction force of radiation. There is no need for a nonlinear Schrödinger equation to explain the reaction effect of an emitted photon on an accelerated electron.

References

[1] Wu, Xiang-Yao *et al.*, “Nonlinear Quantum Wave Equation of Radiation Electron and Dissipative Systems”, arxiv:1003.0247.

[2] Carroll, Robert.L., “The Role of the Inertial Force in Energy Exchanges”, *Galiliean Electrodynamics* **1**, 7, 1990.

[3] Bourgoin, Ron., “Energy Gain Without Cost?”, accepted for publication as a Correspondence in *Galiliean Electrodynamics.*

[4] Bourgoin, Ron., “Energy Exchanges in a Two-Body System”, accepted for publication as a Correspondence in *Galilean Electrodynamics.*