

Abstract Submitted
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Today's "safe" radiofrequency (RF) exposure limits DON'T protect human health near transmitters! MARJORIE LUNDQUIST¹, The Bioelectromagnetic Hygiene Institute — Maxwell's theory implies that electromagnetic (EM) radiation carries both energy and momentum. "The momentum may have both linear and angular contributions; angular momentum [AM] has a spin part associated with polarization and an orbital part associated with spatial distribution. Any interaction between radiation and matter is inevitably accompanied by an exchange of momentum. This often has mechanical consequences ..." ² Voluntary consensus standards [ANSI C95; NCRP; INCIRP] protect human health from most *thermal* [energy transfer] effects, but no standards yet exist to protect health against *athermal* [momentum transfer] effects, though laboratory transfer of spin AM was reported by 1935³ and of orbital AM by 1992² for an optical vortex [tip of Poynting vector (PV) traces a helix about the beam axis]. In the *far field* of a dipole RF transmitter, radiation is linearly polarized (*minimal* spin AM) and locally approximated by a plane wave (*zero* orbital AM), but in the *near field* the orbital AM is *non-zero* [tip of PV traces an ellipse⁴ in air] implying an *athermal hazard* [e.g., brain tumors in cellular phone users] against which *no standard now in use anywhere in the world* protects!

² L. Allen *et al.* Phys. Rev. **A** 45:8185-9(1992). ³ R.A. Beth, Phys. Rev. **48**:471(1935); **50**:115-25 (1936). ⁴ F. Landstorfer, Archiv für Elektronik und Übertragungstechnik **26**:189-96(1972) [in German].

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