Nonlinear Models for Relativity Effects in Electromagnetism

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Z. Naturforsch. **64a,** 327 – 340 (2009); received July 2, 2008 / revised October 13, 2008

Experimental energy measurements tend to be smaller than the predicted values in (i) the absorption of high-energy particles (in cloud chambers) and (ii) the average energy determination of the classical β-ray spectrum of radium E (using magnetic fields). To address these differences in energy measurements, we reconsider relative-velocity-dependent models in electromagnetism proposed initially by Weber before data from cathode-ray-tube (CRT) experiments was available. It is shown that identifying the nonlinear, relative-velocity terms using CRT data results in a model, which (i) captures relativity effects in optics and high-energy particles, and (ii) explains the apparent discrepancies in experimental energy measurements.

Key words: Relative Velocity; Weber; Relativity; Electromagnetism.