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 $\beta$-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.