Charge, from EM fields only. R.L. COLLINS, U.T. Austin, retired —

Purely electromagnetic particle (PEP) models of an electron have until now failed because they do not account for "charge". A model of the electron, built from EM fields only, has been found that generates a $\mathbf{v} \times \mathbf{B}$ inverse square field that resembles the electric field $\mathbf{E}$ we associate with charge. Does this model contain charge? Not really. Gauss’ law says yes, but $\text{div } \mathbf{v} \times \mathbf{B}$ finds no charge density. “Charge” is a mathematical fiction, useful but not fundamental. This model begins with a magnetic flux quantum configured as a magnetic dipole, $\mu$, spinning at $\sqrt{3}$ times the Compton frequency $\nu_C = mc^2/h$. As it decays, energy is transferred to a toroidal displacement current. Oscillation between these configurations proceeds at $\nu_C$. The EM assembly carries angular momentum $\mathbf{L}$, spinning about $\mu$. Spinning $\mathbf{B}$ leads to $\mathbf{v} \times \mathbf{B}$, an electric field that arises everywhere in space from spinning $\mathbf{B}$ and not from some compact central “charge”. Elastic Coulomb scattering must find the electron to be a point particle, without size even though the EM structure itself is huge. $\mu$ undulates but does not reverse polarity. Faraday’s static $\mathbf{E}$ field does not exist in nature. The electric field about an electron is $\mathbf{v} \times \mathbf{B}$, inverse square and undulating at $1.24 \times 10^{20}$ Hz.