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Energy:

$$E = \overline{W} = E_{kin} + E_{pot} = E_{Magn} + E_{Elec} \overset{continuum}{=} \frac{1}{2}kT + \frac{1}{2}kT = kT \overset{quantum}{=} \hbar\omega = h\nu \overset{distribtion}{=} \overset{}{=} h\nu \frac{1}{e^{\frac{h\nu}{kT}} - 1} \overset{rela}{} \tag{1}$$

= linear + rotational + vibration + spin + …?

$$E_{kin}^{max} = eV_0 = h(\nu - \nu_0) \tag{2}$$

Average Energy Densitiy (Electromagnetic Intensity and Poynting-Vector):

$$\langle w_{EM} \rangle = \frac{1}{2}\varepsilon_0(\mathcal{E}^2 + c^2\mathcal{B}^2) = \varepsilon_0\mathcal{E}^2 + \frac{1}{\mu_0}\mathcal{B}^2 = \frac{1}{c}\frac{\mathcal{E}\cdot\mathcal{B}}{\mu_0} = \frac{1}{c}\mathcal{I} = \frac{1}{c}\langle|\vec{S}|\rangle \tag{3}$$

Quest: What is momentum p if there is no mass, $m = 0$?

Quest: Is energy E also the cause for mass m, apart from being the ability to do work W, $\Delta E = W = F \cdot x = m \cdot a \cdot x = mx \cdot \frac{dv}{dt} = mx \cdot \frac{d^2x}{dt^2} = M \cdot \frac{d^2x}{dt^2}$?

Energy manifestation forms: Change (Transfer Movement), Potential (Rest Duration), Temperature, Light, Sound, Mass, Charge, Information, Communication, …

Energy Total:

$$
\begin{aligned}
&E_{Tot} = motion + rest = linear + rotational + vibration + spin + ... = \\
&Work + Heatchange = (F \cdot \Delta r) \mp \Delta Q = E_{kin} + E_{pot} = E_{magn} + E_{elec} = pv \\
&\overset{macro(continuum)}{=} \\
&\frac{1}{2}\frac{p^2}{m} = \frac{1}{2} m \left(\omega A\right)^2 \\
&\overset{thermal}{=} \frac{1}{2} fbT \overset{micro(quantum)}{=} \\
&\hbar\omega = h\nu = \frac{1}{2}\frac{\left(\hbar k\right)^2}{m} = \overset{relativistic}{=} \\
&\sqrt{(pc)^2 + (mc^2)^2} \overset{Entropy}{=} \\
&... \overset{distribtion Fermion}{=} \\
&... \overset{distribtion Boson}{=} \\
&... \overset{distribtion Boltzmann}{=} \\
&...
\end{aligned}
\tag{4}
$$