

Fundamental Principle of Mass

Particle	Rest Mass MeV	Rest Mass (m_o) kg	Measured ~Radius m	Calculated Radius m	Volume (V_o) m ³	Mass Density (ρ) kg/m ³	Calculated Mass _o = $V_o \pi c^2$ kg	Energy ($E_o = m_o c^2$) J	Comparative Relationship $E_o = V_o \pi c^4$
<i>Photon, Neutrino, Gluon & Magnetic Monopole (Graviton) †:</i>	4.14E-21	7.37249720E-51		1.84039725E-23	2.61109900E-68	2.82352267E+17	7.37249720E-51	6.62607004E-34 *	1.0000000000
Electron:	0.5109989	9.10938291E-31	9.0647E-17	9.16648904E-17	3.22624749E-48	2.82352267E+17	9.10938291E-31	8.18710507E-14	1.0000000000
Proton:	938.27205	1.67262178E-27	1.1100E-15	1.12246451E-15	5.92388294E-45	2.82352267E+17	1.67262178E-27	1.50327748E-10	1.0000000000
Neutron:	939.56538	1.67492735E-27		1.12298002E-15	5.93204853E-45	2.82352267E+17	1.67492735E-27	1.50534963E-10	1.0000000000
Up Quark:	24	4.27838842E-29		3.30724809E-16	1.51526619E-46	2.82352267E+17	4.27838842E-29	3.84522375E-12	1.0000000000
Down Quark:	48	8.55677685E-29	Schwarzschild radius r_s (Event Horizon)	4.16687149E-16	3.03053237E-46	2.82352267E+17	8.55677685E-29	7.69044751E-12	1.0000000000
Top Quark:	1.71E+05	3.05191708E-25		6.36645412E-15	1.08088988E-42	2.82352267E+17	3.05191708E-25	2.74292628E-08	1.0000000000
(Black Hole: $M_\odot \times 8.0786$)		1.60691433E+31	2.3862E+04	2.38618592E+04	5.69116850E+13	2.82352267E+17	1.60691433E+31	1.44422257E+48	1.0000000000
(Black Hole: $M_\odot \times 17 \times 10^9$)		3.38147000E+40	5.0213E+13	3.05779630E+07	1.19760682E+23	2.82352267E+17	3.38147000E+40	3.03911367E+57	1.0000000000

Key: [variant (m), Hypothetical] - travel at c , Elementary, Composite, Postulated[#] (min. & largest detected) Λ [*Demo at Planck's min. quanta of energy (h), therein, determines min. particle mass & size.]

Conclusions: $r_s = (2Gm)/c^2$ Absolute!

- Absolute Density $\rho_{abs} = \pi c^2$ — Relativistically Constant $\gamma = \frac{1}{\sqrt{1 - (v^2/c^2)}}$ $h =$ Planck constant
- Particle Rest Mass $m_o = V_o \pi c^2$ ($= hf/\gamma c^2$) Particle Relativistic Mass $m = V_o \gamma \pi c^2$ $f =$ Wave frequency
- Particle Rest Mass-Energy $E_o = V_o \pi c^4$ ($= hf/\gamma$) Particle Relativistic Mass-Energy $E = V_o \gamma \pi c^4$ $(= hf)$

- Mass emerges from vacuum energy (c^2 J·kg) condensing into absolute dense orbs (π) where distinct or relativistic variant volumes (V) culminate in particles.
- Einstein's unification of mass and energy amount to two different aspects of the same entity: vacuum energy - *subquantum* scalar platform for mass-energy conservation.
[Note: Additional to E , m and c interrelated by $E = mc^2$, c is potentially regulated by vacuum energy density (ν_ρ) if $c = \sqrt[3]{(1/\nu_\rho)}$ where experiment/observation: $\nu_\rho \sim 10^{-26}$ kg/m³ ($E_\rho \sim 10^{-9}$ J/m³). Is $\nu_\rho = 1/c^3$?]
- There are NO such things as massless particles - demonstrated minimum rest mass & size. ([†]*Differentiating relativistic mass & size dependent on energy carried: $V_o f \pi c^4 = hf$.*)
- Einstein's formulation ($E = hf$) is plainly incorrect at frequencies ≤ 1 Hz; an inaccuracy that extends but diminishes towards 10^{10} Hz. (Rectification at lower f is: $E = h \gamma$.)
- At higher frequencies: f and γ values converge allowing eventual infinity produced by γ to be renormalized by $\gamma = f$ (validating $E = hf$ where h is min. rest energy.)
- Renormalization of γ establish particle velocities (v) are directly related to their frequencies: $v = c - (1/f)$; used to ascertain γ in reconciling second to above conclusion.
[Note: Difference in v for average frequency of visible light (5.4×10^{14} Hz) travelling in a vacuum corresponds to 17.5 metres (5.84×10^{-8} seconds) less than C per light year. (C is an absolute constant.)]
- Black holes are NOT singularities. ([#]Postulate each culminates in ultimate composite particles - accreted quark-gluon plasma at absolute density - technically quark stars.)
- Phenomenon of the Big Bang was NOT due to a quantum fluctuation in which entire matter originated from a singularity - an infinitesimal dense volume.
- Concept of Higgs mechanism is in disaccord with vacuum energy synthesis of mass-energy conservation. Eduction of new boson as Higgs thereby remains ambiguous.
- Principle of Mass is the product of its major constituents: volume and density. Fundamentally, particle mass is proportionate volume of (vacuum) energy at absolute density.