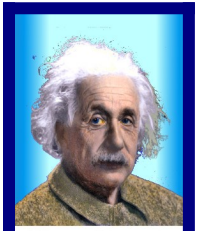
Einstein Extremes



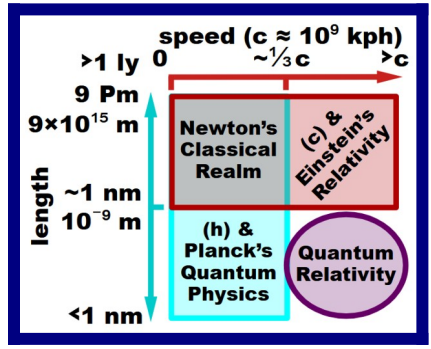
Albert Einstein
1879 – 1955

Since 1905, Einstein has made revolutionary advances in Physics. He refined Quantum ideas & invented Relativity.

From his photon theory, light is transmitted in "quanta" of Energy (E_0):

$$E_0(\nu) = h\nu$$

From Newton in 1687, 3-vector lengths ($r^2 \equiv \mathbf{r} \bullet \mathbf{r}$) are constant in spatial rotations. Mass – Δm_0 & Time – Δt are scalars.



3D Momentum: $\mathbf{p} \equiv m_0\mathbf{u}$ **Kinetic Energy:** $E = \frac{1}{2}m_0u^2$

With Special Relativity, we live in 4D spacetime, clock rates vary. 4-vector length ($R^\mu R_\mu \equiv (ct)^2 - r^2$) is conserved in spatial rotation, velocity boost.

Lorentz Factor: $\gamma \equiv 1/\sqrt{1-u^2/c^2}$ **with 3D velocity - u**
3D Momentum: $\mathbf{p} \equiv \gamma m_0\mathbf{u}$ **Total Energy:** $E \equiv \gamma m_0c^2 \approx m_0c^2 + \frac{1}{2}m_0u^2 + \cdots$
4-Position: $R^\mu \equiv (ct, \mathbf{r})$ **4-Momentum:** $P^\mu \equiv (E/c, \mathbf{p})$

Einstein helped define extremes setting challenges in Modern Physics.

Wikipedia.org