HOW TO INCORPORATE GENERAL RELATIVITY INTO QUANTUM SCATTERING

The two references contain all the physics background that is needed.

The S-matrix for the scattering of an electron by a Coulomb potential contains the integral[1]

$$\int \frac{-ed^3x \exp(-i\vec{q}.\vec{x})}{4\pi|\vec{x}|}. \tag{1}$$

The Coulomb potential $A_0 = \frac{-e}{4\pi|\vec{x}|} = g_{00}A^0$ where $g_{00} = 1$.

For a point mass and a point charge,[2]

$$g_{00} = 1 - \frac{2m}{|\vec{x}|} - \frac{Ce^2}{2c^2|\vec{x}|^2}. \tag{2}$$

The S-matrix now contains the integral

$$\int \frac{-ed^3x \exp(-i\vec{q}.\vec{x})}{4\pi|\vec{x}|}(1 - \frac{2m}{|\vec{x}|} - \frac{Ce^2}{2c^2|\vec{x}|^2}). \tag{3}$$

Perform the integration. Proceed as before to calculate the cross section. The two new terms show the effect of general relativity on the quantum mechanical scattering of an electron.

Perhaps this calculation will explain current problems in cosmology without the need for dark energy and dark mass.

The constants m and C are determined by experiments on macroscopic objects. Perhaps m and C have different values for subatomic particles.

References

[1] Bjorken and Drell, *Relativistic Quantum Mechanics*, Mc-Graw Hill, 1964, pp 100-106.

[2] Adler et al, *Introduction to General Relativity*, Mc-Graw Hill, 1975, pp 486-491.

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