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Comparison of Corrections to the Helmholtz and Schrodinger Equations using First Order Perturbation Theory[1] PRESTON POZDERAC, CODY LEARY, College of Wooster — We studied the effects of a photonic correction term, derived from Maxwell's equations, to the Helmholtz equation by comparing it to the electron's relativistic correction term to the Schrodinger Equation that derives from the Dirac Equation. These correction terms are found in differential equations of the form $H\Psi + H'\Psi = \lambda\Psi$ where H is the Helmholtz or Schrodinger Hamiltonian without the correction, H' is the correction, Ψ represents the eigenfunctions, and λ the energy eigenvalues. We examined the photon correction term in the case of a spherically symmetric refractive index, which acts as an analog to a spherically symmetric potential for the electron. Using first order perturbation theory, we calculated the first order corrections to the photon's frequency given by the eigenvalues of the Helmholtz equation. The first order photon frequency corrections were examined by comparing the energy level diagrams of the electron and the photon.

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