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## Auto-stabilized Electron

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We include effects of self-gravitation in the self-interaction of single electrons with the electromagnetic field. When the effect of gravitation is included there is an inevitable cut-off of the k-vector - the upper limit is finite. The inward pressure of the self-gravitating field balances the outward pressure of self-interaction. Both pressures are generated by self-interactions of the electron with two fields - the vacuum electromagnetic field and the self-induced gravitational field. Specifically we claim that gravitational effects must be introduced to stabilize the electron. We use the Einstein equation to perform an exact calculation of the bare mass. We find a close-form solution. We find the electron radius  $r_e = \sqrt{\alpha/4\pi} \sqrt{\hbar G/c^3}$ . Traditionally the second quantity which is called the Planck length  $\ell_P$ , is deduced here from first principles. We find that the electromagnetic and gravitational fields merge at  $\sqrt{\alpha/16\pi}$  of the interior and exterior metrics at  $r_e$ .

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