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A Second-Order-of-Accuracy Derivation of the Newton Gravitation Constant From The GEM Unification Theory JOHN BRANDENBURG, Orbital Technologies Corporation — In the GEM theory of unification,[1] a combination of the Kaluza-Klein and Sakharov unification theories, the appearance of the Kaluza-Klein 5^{th} dimension allows the separate appearance of electrons and protons from the vacuum. This occurs by having the masses of the electron and proton merge smoothly as the radius of spacetime curvature approaches the Planck length, and also separate smoothly as a new 5^{th} dimension is inflated to its "compact" size $r_o = e^2/m_o c^2$, in esu, where $m_o = (m_p m_e)^{1/2}$ where e, and m_p and m_e, are the electron charge, proton and electron masses respectively. The 5^{th} dimension appearance inflates from the Planck Length: $r_P = (G\eta/c^3)^{1/2}$ An improved model features the relationship between $\sigma = (m_p/m_e)^{1/2}$ and the radius of curvature r_c where the 5^{th} dimension inflates from $r_c = r_P \rightarrow r_o$ and $\sigma = 1 \rightarrow 42.8503$ is now rationalized near the Planck length to be $\ln(r_c/r_P) = \sigma/(1+0.8473/\sigma^3)$ so that $\sigma=1$ inside the event horizon $2r_P$. and the formula gives a more accurate expression for the value of σ after inflation. The formula after inflation is inverted to find a new 2^{nd} order expression for G: $G = e^2/(m_p m_e) \quad \alpha \exp(-2(\sigma - 0.847319574/\sigma^2 \ldots.) = 6.67419 \times 10^{-8}$ dyne-cm^{2}gm^{-2}, where α is the fine structure constant, and is within experimental accuracy of the measured value.

[1]Brandenburg, J. E., (1995), Astrophysics and Space Science, 227, p133.

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