Mikhailov's Experiments : Weber vs. Einstein or Weber plus Einstein ?

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V.F. Mikhailov measured changes in the electron's inertial mass when it is located inside a uniformly charged spherical shell [1]. The above mass, calculated by Assis [2] with the aid of Weber's force [3], reads $m = m_o(1-qU/3c^2)$ for a charge q placed in a region in which Coulomb's potential is worth U.

In page 161 of Reference1 Mikhailov wrote:

"So, if q and U have same (opposite) signs there is a decrease (increase) of the particle`s effective mass". Then, for $q = -e$ and $U = Const.(Q/R) > 0$, we get $m = m_o(1 + eU/3m_oc^2) > m_o$.

We remember now that also Einstein's mass-energy equivalence, $dm_E = Energy/c^2$, allows us to predict an electron mass dependence on an electrostatic potential, being of the same order of magnitude, but opposite in sign. As a matter of fact, we have described the *electronic mass defect* which takes place in an atomic electron [4].

Let us consider an electron inside a (radius R, charge Q) positively charged spherical shell. Electrostatic potential energy reads $-eU < 0$ (we need to do work on the electron in order to bring it to infinite), being $U = Const.(Q/R) > 0$ the Coulomb's potential and $e = +1{,}6x10^{-19}\ C$. Einstein's effect reads $dm_E = -eU/c^2 < 0$, i.e. a **mass-defect** takes place, and we *get* $m = m_o + dm_E = m_o(1 - eU/m_oc^2) < m_o$, for the electron's inertial mass.

According to Einstein's mass-energy equivalence we add:

"So, if q and U have the same (opposite) signs there is an increase (decrease) of the particle's effective mass. If both Weber and Einstein are right, then the whole measurable effect would be $m = m_o + dm_W + dm_E \approx m_o(1-2eV/3c^2)$.

References

[1] V.F. Mikhailov, *Ann. Fond. Louis de Broglie,* **24**, 161 (1999) ; **26**, 633 (2001)
[2] A.K.T. Assis, *Journ.oOf the Phys. Soc. of Japan*, **62**, 1418 (1993).
[3] A.K.T.. Assis, "Weber Electrodynamics", Kluwer, Dordrecht (1994).
[4] J. Guala-Valverde, *Physica Scripta*, **43**, 551 (1991).

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