

# ON THE COUPLING BETWEEN GRAVITY AND ELECTROMAGNETISM THROUGH QUANTUM VACUUM ENERGY DENSITY

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The possible unification between electromagnetism and gravity is one of greatest challenges in Physics. Some years ago, B. Haish, A. Rueda and H.E. Puthoff proposed a model according to which inertia and gravity could be interpreted as the electromagnetic reaction force to the interaction between charged elementary particles contained in a body and quantum vacuum fluctuating electromagnetic modes (ZPF). Sharing this idea as a starting point we interpret the mass not as an intrinsic properties of body but as the result of an electromagnetic dynamic interaction, substantially of resonant type, between body or particle and quantum vacuum in which it is “immersed”. So it is expected that if a change in the related resonance frequency is induced by modifying the boundary conditions as, for example, through the introduction of a strong electromagnetic field of suitable frequency, the inertial and gravitational mass associated to that body will also be modified. On the other hand, during the past years, several theoretical and experimental evidences, more or less satisfactory, have been supported the development of the so-called “electrogravity”, namely the use of high voltage electromagnetic fields to provide propulsive force due to a modification of inertia of a body. In particular, the possibility to modify gravitational mass by altering the interaction between a massive body and quantum vacuum ZPF suggests also gravity could ultimately be a result of the dynamics of quantum vacuum resulting by a modification of quantum vacuum state, in particular by a variation of Zero Point Energy density. In this paper we have shown, also basing on previous results and starting from the assumption that not only inertia but also gravitational constant  $G$  could be truly a function of quantum vacuum energy density, that the application of an electromagnetic field is able to modify the ZPF energy density and, consequently, the value of  $G$  in the region of space containing a particle or body. This result particularly suggests a novel interpretation of the coupling between electromagnetic and gravitational interaction ruled by the dynamical features of ZPF energy. Apart from its theoretical consequences, this model could also proposes new paths towards the so-called ZPF-induced gravitation with very interesting applications to advanced technology, briefly discussed in this paper as well.