

GRAVITATIONAL EXPERIMENT

by

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ABSTRACT

A gravitational experiment with an elongated triangularly shaped thin horizontal needle made of thin bronze and pivoted at its presumed center of mass so to rotate freely in the Earth's gravitational field is described. The experiment shows that after some oscillations, that needle assumes the North-South direction identical to the N-S direction of an ordinary magnetic compass. The same experiment was performed using needles made of wood, aluminum and brass with the identical results. These experimental results prove that the quark hypothesis is absolutely unnecessary. Quark appears to be only a dogmatic fiction.

The Earth's gravitational field has been extensively analyzed experimentally using a ball small enough compared to the Earth to be considered as a point mass with the well-known results. But the experiments with the triangular thin needle made of bronze and pivoted at its presumed center of mass to be horizontal and able to rotate freely in the horizontal plane in the Earth's gravitational field, yield some very interesting results, which are not mentioned in the literature so far.

An equilateral elongated triangle with the base of 9 mm and height of about 100 mm was cut from a bronze sheet of 0.16 mm thickness, and then shortened to 90 mm to form an elongated trapezoid with the upper side of approximately 1 mm whose mass was measured to be 0.8 grams. Using a steel ball of the diameter of 0.5 mm, a semispherical cavity – dent was made very carefully by an appropriate tool at the approximate center of mass (or weight) of that needle. An aluminum pedestal, to which a brass cylinder of diameter 2 mm was attached to be strictly vertical and carrying coaxially fitted the balance wheel axle-shaft of the smallest mechanical watch, was used as a pivot. The diameter of that balance wheel axle is about 75 microns, whose tip is actually a calotte, semispherical. On that pivot tip, the above described bronze needle was placed at its semispherical cavity. Since the semispherical cavity - dent was formed approximately, the needle is normally not horizontal, but can be made to be strictly horizontal by filing it very carefully around its sides. Everything is now ready for the experiment. It should be mentioned that the ruby bearings for the balance wheels of small watches introduced more friction than the said dents.

The aluminum pedestal with the described bronze needle freely rotating in the horizontal plane was placed on an electrically grounded horizontal aluminum plate about 1 mm thick in author's tightly closed living room without any heating element to avoid any movement of air, and the rotation of the bronze needle was observed. It was observed that that needle oscillated quite slowly reaching finally the balance direction which was

found to be the North-South direction of an ordinary magnetic compass, with the sharp end of that bronze needle pointing towards the North. That bronze needle remained in that balance direction indefinitely, until disturbed by the obvious air movement due to the movement of the experimenter (author), or if the door of that living room was suddenly opened, causing the strong air movement. It was observed that after such air disturbance, the bronze needle oscillated slowly around the magnetic N-S direction and stopped, assuming again that N-S balance direction and remaining there indefinitely, provided that no further air disturbance was allowed to occur. This experiment was repeated at another location in Belgrade under the identical circumstances with the identical results. The externally applied magnetic fields caused some movement of the described bronze needle, which should be investigated separately.

This experiment was also performed with the similarly constructed needles made of brass, aluminum and wood, except that in the case of the wooden needles, the suitably attached brass piece was used to create the semispherical cavity – dent for pivoting. The wooden material exhibits too strong friction with the described pivoting tip. That attached brass piece for the semispherical cavity – dent for pivoting secured freer rotation of the wooden needle. The observed results were identical as obtained and described for the bronze needle above. These results prove the axial property of the Earth's gravitational field due to the Earth's flattening. These results were demonstrated during this author's seminar lecture on November 22, 2007 at the Faculty (College) of Mechanical Engineering, University of Belgrade in Belgrade.

The explanation of the obtained results is beyond the scope of this paper, which is written with the only purpose to report this experiment with the sufficient details, so that anybody who is interested, can repeat such an experiment. This author is very interested to learn about the results of such experiments at other locations around the world. It is obvious that the centrifugal acceleration due to the Earth's rotation is ruled out for the explanation of the results of this experiment, since the bronze needle, being horizontal, is pivoted at its presumed center of mass. Also, diamagnetism and paramagnetism of the said needles cannot explain the obtained results of these experiments. It is described in the literature that the needles made of diamagnetic and paramagnetic materials may rotate in strong non-uniform magnetic fields, but the Earth's rather weak magnetic field is practically uniform within a room of the ordinary apartment buildings in Belgrade, in which these experiments were performed. The well-known International Gravity Formula does not give any clue for the explanation of the obtained results. Due to the very strict grounding, electrical charge is also ruled out, but in fact, the careful removal of the electrical grounding caused no difference of the observed results.

It appears to this author that the observed results of these experiments in the Earth's gravitational field are very interesting and very important, since they show undoubtedly a very intimate relationship between the conventional Earth's magnetic field and the Earth's gravitational field, particularly the Earth's flattening. These experiments can and certainly should be performed at various locations around the world, South as well as North of the equator. This author considers that they prove his unified field theory as presented on <http://jovandjuric.tripod.com> and also briefly outlined in his Fifth

Award winning essay “Gravitation and Electromagnetism” in the 1963 Competition of Essays on Gravity of the Gravity Research Foundation. These experimental results are fully in agreement with the theoretical results in this author’s paper “MAGNETISM AS MANIFESTATION OF GRAVITATION” which is available in the pdf format on the above mentioned Internet Site of this author, in which the analysis is done using strictly the classical Newton’s theory of gravity, but the coordinate origin of the geophysical coordinate system is moved from the center of mass of the Earth to the center of gravitation of the Earth, at which point the Earth’s gravitational field is zero. It is concluded in that paper that the error in considering the center of mass of the Earth as the center of gravitation of the Earth concealed the fact that the planetary magnetism is the manifestation of gravitation.

The results of the above described experiments prove that the intrinsic mass moment of a mass distribution, as calculated by definition with respect to the center of gravitation of that mass distribution, must be considered as the conventional magnetic moment of that mass distribution with the factor of proportionality which depends on the units and the material property of that mass distribution. The center of gravitation of a mass distribution is the point where the gravitational field of that mass distribution is zero, to repeat again. This fact also holds for **any elementary particle**, which **must possess** its center of mass and its center of gravitation as the two distinctly different points due to the ever-present external gravitational field, and consequently, **its intrinsic mass moment, i.e., its magnetic moment, i.e., the evident asymmetry of that particle. The deviation from the perfect symmetry of some subatomic particles was presumably observed and reported. Thus, the quark hypothesis is absolutely unnecessary.** As it is known, some outstanding scientists, Heisenberg, Chew and others, disapproved of the quark hypothesis. The hypothetical particle *quark* appears to be only a dogmatic and unnecessary fiction.

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