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EXPERIMENTAL EVIDENCE OF A NEW TYPE OF QUANTIZED MATTER WITH QUANTA AS INTEGER MULTIPLES OF THE PLANCK MASS

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Results of experiments are presented to check the law of conservation of mass in a special chemical reaction in which metallic silver is generated from two homogeneous solutions in thermodynamically closed systems. After careful exclusion of artifacts, mass deviations between test samples and identical reference samples without chemical reaction (100 g each) were observed of $> 2000\,\mu g$ which are about 420 times larger than the 95 % confidence interval $c_T \leq \pm 5\,\mu g$ of the baseline pretest and which are by a factor of 10^{15} larger than expected relativistic mass effects. Stepwise mass changes indicate the existence of free quanta of the new form of low energetic (i.e. "cold") and non-visible (i.e. "dark") matter with a real mass content as integer multiples of a modified Planck mass, i.e. $\sum_{n_S, S} n_S \cdot \sqrt{h \cdot c \cdot S/(2 \cdot \pi \cdot G)} = \sum_{n_S, S} n_S \cdot 21.7 \cdot \sqrt{S}\,\mu g$, with n_S = 1, 2, 3 etc., and S = 1/2, 1, 3/2, 2, 5/2, and 3, which can be absorbed or emitted by the test samples used as detectors. The quanta of the new form of matter have a spatially extended "field-like" structure, complementary to the "point-like" structure of normal elementary particles. The new form of matter shows with normal matter on a laboratory scale a so far unknown "topological", i.e. formspecific, interaction and a gravitational one. As a consequence of the verification of the new type of matter basic questions about condensed forms of matter and, for example, the basic mechanism of gravity arise.

1 Introduction

The most precise experimental tests of the law of conservation of mass are the studies of Landolt [1,2] and others (see references 1 through 5 in [3]) between 1890 and 1913. Landolt tested the law of conservation of mass in 10 different types of chemical reactions. If for two subsequent tests using the same reaction, no pre-post weight difference was larger than $\pm 30\,\mu g$, i.e. the maximum experimental error, the test was not repeated. 8 out of the 10 chemical reactions fell into this category. Assuming constancy of the gravitational acceleration of the Earth during a test, Landolt concluded constancy of mass for chemical reactions in general [1]. However, for the formation of metallic silver and solid forms of iodine from two homogeneous aqueous solutions, respectively, the majority of the repeatedly performed tests showed positive and negative mass deviations in the pre-post comparison [2], up to a factor of 6 larger than the experimental error and up to a factor of 10^{15} larger than relativistic mass effects due to exothermic heat loss. Landolt discarded these deviations [1,3] first in 1908 and finally in 1910 after Einstein's publication of his special theory of relativity in 1905. In the following, results are presented which verify these deviations by applying the reaction where metallic silver is generated from two homogeneous aqueous solutions, i.e. by mixing an aqueous glucose solution and Tollen's reagent:

$$(C_5H_{11}O_5)\text{-}CHO + 2[Ag(NH_3)_2]OH \rightarrow (C_5H_{11}O_5)\text{-}COOH + 2Ag + 4NH_3 + H_2O$$

2 Experimental Method and Results

Experimental Method: Four 50 ml round bottom glass flasks (unused) each with flat bottom and standard joints, closed gas-tight (up to 3 barg, using corresponding glass stoppers with high-vacuum grease and stainless steel strings), were used as thermodynamically closed systems. Two contained only water or glass balls as inert material and served as reference samples (masses m_{r1} and m_{r2}) while within the other two the above given chemical reaction was performed (3 ml of 2 molar glucose solution and 17 ml of Tollen's reagent; reaction was completed after about 6 min) and thus served as test flasks (masses m_{t1} and m_{t2}). Using a comparator (SARTORIUS C 1000) with a reproducibility of $c_R = \pm 2\,\mu g$ the masses of the reference and test flasks (100 g each) were determined automatically. Isothermic conditions were reached about 5 h after the reaction. The four samples were weighed in a special sequence [3] (one complete weighing cycle took about 20 min) for several weeks/months without opening the inner weighing and external insulating compartments of the comparator. Data evaluation was done for the two test flasks (j=1, 2) for each measuring cycle i according to (where i=0 was given by the first measurement cycle after reaching isothermic conditions; for further details see [3], pages 243 - 249):

$$\Delta m_{j,i} = [(m_{tj} - m_{r1}) - (m_{r2} - m_{r1})]_i - [(m_{tj} - m_{r1}) - (m_{r2} - m_{r1})]_{i=0}; \quad (j = 1, 2)$$

Baseline tests were performed using four identical samples with inert fillings resulting in baselines with $\Delta m_{1,i} = \Delta m_{2,i} = 0\,\mu g$ and a 95 % confidence interval of $c_T \leq \pm 5 \mu g$. Intensive artifact research showed that even strong changes in external atmospheric conditions (thunderstorm), electromagnetic influences or radiations, static or dynamical water absorption on the surface of the samples, dynamical free convection effects, internal changes of pressure within the samples, or changing tidal forces from the moon, for example, did not influence the tests beyond the above given error of the baseline. Thus, any deviations $\Delta m_{j,i} > |5|\,\mu g$ indicated significant non-relativistic violations of the law of conservation of mass in chemical reactions.

Results: A set of 5 tests was performed, each with two independent test flasks, according to the experimental method described above, yielding the following results.

1: The hypothesis is further confirmed that newly generated phase borders (in this case silverplating of the test flasks) lead in a time dependent process to highly significant measuring effects[3]. Mass deviations of $\Delta m_{j,i} = 2100\,\mu g$ were observed which are 420 times larger than the 95 % confidence interval of the baseline pretests and which are by a factor of 10^{15} larger than expected relativistic mass effects. In all tests the results for $j=1$ and 2 showed similar patterns.

2: If the test flasks contained only the chemical ingredients described above it took between 4-5 days until a significant positive, linear increase in mass of the test flasks from the baseline could be observed, leading to values of the measuring effect of up to $\Delta m_{j,i} > 470\,\mu g$ after another 11-12 days while the mass difference between the two reference flasks remained constant. Superimposed to the linear increase of the mass of the test flasks also positive stepwise mass changes were observed followed by similar negative mass changes. - When the test flasks contained in addition diamond dust, ground to micrometer sized particles (200 mg), highly significant stepwise positive mass changes of the two test flasks took place within a few minutes after the start of the chemical reaction, followed again by negative mass changes[3].

3: Under the basic assumption that the law of conservation of energy is still applicable to the systems, the deviations of $\Delta m_{j,i} > |\,5\,|\,\mu g$ can be interpreted as due to the absorption of a so far unknown form of matter with real mass (and energy) content by the test samples followed by corresponding emission processes.

4: By evalutating the number and size of the stepwise mass changes in the tests, a distribution results with very clearly separated peaks. They can be described quantitatively **(a):** as integer multiples of the Planck mass $m_P = n \cdot \sqrt{h \cdot c/(2 \cdot \pi \cdot G)} = n \cdot 21.7\,\mu g$, with $n = 1, 2, 3$ etc., and in general by $\sum_{n_S,S} n_S \cdot m_P \cdot \sqrt{S}$, with $n_S = 1, 2, 3$ etc. and $S = 1/2, 1, 3/2, 2, 5/2$, and 3; **(b):** by a modified Einstein mass $m_{E,mod} = \sqrt{h \cdot S/(2 \cdot \pi \cdot \kappa \cdot c^3)} = m_P \cdot \sqrt{S}/\sqrt{8 \cdot \pi} = 4.3 \cdot \sqrt{S}\,\mu g$ with $S=1/2$ and 1 (and with Einstein's gravitational constant $\kappa = 8 \cdot \pi \cdot G/c^4$). These results support the interpretation that quanta of the new form of matter with quantized masses and associations of such quanta exist in free form and were absorbed and emitted by the test samples used as detectors. **(c):** An analysis of the linear mass increases in the tests leads furthermore to mass contents of the new type of matter of $\leq 2\,\mu g$.

5: If test flasks were cleaned and used again in a test they showed a memory effect even during baseline tests. In connection with such pre-used test flasks also the absorbtion of quanta of the new form of matter with negative masses

was observed.
6: The new form of matter interacts with normal matter (at least) gravitationally and by a so far unknown "topological", i.e. formspecific, interaction at phase borders which is about 15 orders of magnitude stronger than the gravitational one.
7: Water is able to absorb or emit quanta of the new form of matter which may possibly interact at the internal dynamic phase borders of the water clusters.
Additional Results Obtained Under Modified Experimental Conditions: 8: This previously unknown form of quantized, low energetic (i.e. "cold"), and non-visible (i.e. "dark") matter shows a spatially extended "field-like" structure (revealed by synergistic effects [3]) opposite to the "point-like" structure of normal matter (called in general bradyons) and can therefore be termed "non-bradyonic".
9: During a visible partial sun eclipse on October 12, 1996, the mass of an internally silverplated test flask showed on a two pan balance (SARTORIUS M 25 D-V, $c_R=\pm 1\,\mu g$) an increase in mass which followed the covering of the sun by the moon, and after passing through the corresponding maximum (+16 μg) exhibited several strong fluctuations before it settled to the baseline values before the sun eclipse.
10: The new type of matter seems to form a background radiation as an ubiquitous "weighable ether" [2] which contributes to cold dark matter [3] in the universe.

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