ISSN: 2639-0108

Research Article

Advances in Theoretical & Computational Physics

Cold Start with Two Particles and A Big Bang, Splitting of Matter and Antimatter and Accelerated Expansion of The Universe

Maarten J. Van der Burgt*

Beatrixlaan 7, 1921BP Akersloot, the Netherlands.

***Corresponding Author**
Maarten J. Van der Burgt, Beatrixlaan 7, 1921BP Akersloot, the Netherlands. Email: maagburgt@gmail.com, tel.: +31-(0)-251-312418, cell: +31-(0)-622-904-277.

Submitted: 2024, Feb 29; **Accepted:** 2024, Mar 26; **Published:** 2024, Apr 12

Citation: Maarten J. Van der Burgt. (2024). Cold Start with Two Particles and A Big Bang, Splitting of Matter and Antimatter and Accelerated Expansion of The Universe. *Adv Theo Comp Phy, 7*(2), 01-04.

Abstract

There are three data that are available to be used as a basis for understanding the notions as fields, gravity, forces, mass, and energy. These data are a maximum velocity (c) and two basic particles; one with a charge of ⅓ of an electron and another with a charge of ⅓ of a positron. Each particle is contained in a sphere. These spheres are bounced together whereupon static photons are formed that form the basis for all fields. Some of these photons react further with 1-3 basic particles of the same charge to form proto quarks and proto leptons. These proto particles react further with static photons to form more spherical particles that ultimately result in stable fermions. Energy manifests itself by polarisation of static photons forming a field. Gravity becomes an electro-magnetic force. Mass manifests itself by polarisation of static photons and forces are the result of communicating field photons.

Keywords: Cosmology, Gravitation, Antimatter, Symmetric Universe, Photons, Fields, Energy, Matter, Antimatter.

1. Introduction

The lack of knowledge about the machinery of the universe has got little attention. Because of this lack, notions as mass, forces, gravity, energy and fields are used without understanding their machinery or what causes these notions.

In literature one can find that the universe started with a 17 cm diameter crystal ball that for unknown reasons explode with a Big Bang [1]. It is proposed to divide the volume of the ball into two 0.135 m diameter spheres, one containing densely packed particles with a charge of ⅓ of an electron and another with a charge of ⅓ of a positron. Fig.1 [2]. The particles inside each sphere will not repulse each other because there are no fields yet. For the same reason the two spheres will not attract each other. Not knowing how spheres are brought together it becomes plausible that it is with a velocity (*c*) to their common centre. This implies a low temperature, low entropy start of the universe. The collision results in a Big Bang.

The first dumbbell shaped particles formed upon collision are very high-energy photons essential for the formation of all fields.

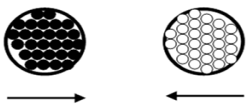

Figure 1: Colliding spheres of positive and negative basic particles at the start of the universe.

All fields, also the gravitational field? Yes, it was Feynman who ventured already that eventually it will be discovered that gravitation has an electro-magnetic origin [3]. He based this assumption on the fact that both electro-magnetic forces and gravitation are inversely proportional to the distance of bodies. Hefty events resulting in gravitational waves appear to travel with velocities of almost (c) supporting Feynman's idea. If gravitation is an electro-magnetic force, this would imply that matter and antimatter would repulse each other and violation of the Weak Equivalence Principle (WEP) [4]. Research with antihydrogen seems to confirm the WEP. However, these experiments were carried out in very strong magnetic fields that could affect the behaviour of the (anti)hydrogen atoms when gravity is an electro-magnetic force [5].

2. Expansion

A thought experiment for a one-dimensional matter-antimatter universe supports the accelerated expansion and the very high acceleration at the start. Fig .2 and 3. [6, 7.]

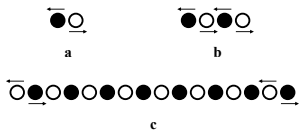

Figure 2: Initial movements of black matter and white antimatter bodies in one dimension.

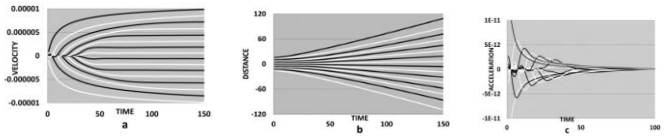

Figure 3: Velocities (a), distances (b) and acceleration (c) as a function of time for 16 bodies of alternating matter (black lines) and antimatter (white lines) in one dimension. Initial distance between bodies 2.1 times the body radius. One time unit is 6.66 x 10^4 s.

In the figures SI units are used for bodies having a mass M of one kg and an initial distance D between bodies of one metre. Time units are calculated with the dimensionless Jacob number:

$$J = \frac{GM\Delta t^2}{D^3}$$

Where G is the gravitation constant. For most calculations a J value of 0.04 suffices to ensure smooth trajectories of the bodies. For larger objects like galaxies the data in Table 1 can be used when M and D are known and the time unit Δt has been calculated with the above formula. Multiplication factors for galaxies and clusters are given in Table 1. These can be used for the interpretation of data in Fig.3. Interesting is the very high initial acceleration that drops steeply [8].

Variable	Mass	Radius	Velocity	Acceleration	Time interval
Standard	1	1	1	1	1
Galaxy	2E41	1.5E20	3.7E10	8.9	4.1E9
Cluster	6E45	5E 22	3.5E11	2.4	1.4E11

Table 1: Multiplication factors for converting standard data into data for galaxies and clusters.

3. Fields

Fields are created by the presence of bodies. This makes that there is nowhere a virgin field with random orientation of photons in the universe. The essentially static field photons have an energy/frequency ratio of Planck's constant (h) and are the building blocks for all fields.

4. Proto Quarks and Leptons

A very small portion of these photons react with additional basic particles. When a photon is hit by a negative basic particle a proto-quark is formed with a charge of ⅓ of an electron and a spin ½h (Fig.4). Proto-quarks with charges of ⅔ e are formed when the positive centre in this this proto-quark is hit by an additional negative basic particle. Finally, a proto-lepton with a charge of e will form when the central positive particle in a proto-quark with a charge of ⅔ e is hit by yet another *negative* basic particle. The spin remains ½h for all these particles. In a similar way positive proto-quarks and leptons are formed. Fig. 4.

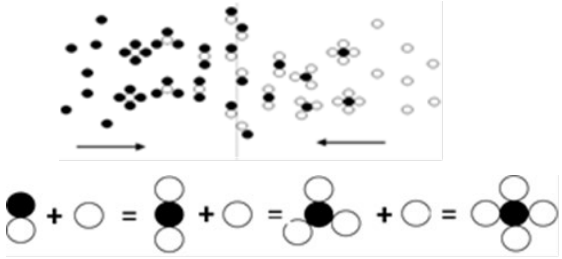

Figure 4: Formation of proto quarks and leptons by collision of a static photon with one, two and three basic particles with the same charge.

5. Mass

The new look at gravity and fields also requires a new look at mass. What causes mass? [9].

It creates a field by polarisation of surrounding photons. When it creates an electro-magnetic field how can the mass defect be interpreted? In accelerators the ratio e/m is attributed to a mass defect of $1/\sqrt{(1\text{-}v^2/c^2)}$. Why not to a charge defect of $\sqrt{(1\text{-}v^2/c^2)}$.

Applying this charge defect to the constituent charges in both atoms and neutrons results in a very small attractive force because the negative charges having a somewhat higher velocity

are concentrated are their peripheries. By changing charges, the results for antimatter are obtained.

6. Energy

Energy manifests itself as polarisation of the field photons. Forces are caused by polarisation of field photons in the presence of bodies. The mass of the total universe amounts to 3.8 E55 kg or 3.4E72 J. The energy in particles is only a fraction of the energy in field photons , The energy stored in all field photons must be orders of magnitude higher and the radius of the basic particles will be correspondingly lower. Table 2.

7. Photons

The sum of the rotational and translational velocity of photons may not exceed (*c*). Hence, the field photon has hardly any translational velocity whereas photons that move with a translational velocity of almost (*c*) have a relatively small rotational velocity. This implies that red light would travel slightly faster than blue light.

Basic particles				Field photons		Universe
Radius	**Volume**	**Number**	**Circumference**	**Frequency**	**Energy**	**Energy**
M	m^3	In each sphere	m	1/s	J	J
1.0E-20	4.2-60	3..1+56	6.3E-20	4.8E+27	3.2E-6	9.7E+50
1.0E-25	4.2E-75	3..1+71	6.3E-25	4.8E+32	3.2E-1	9.7E+70
1.0E-30	4.2E-90	3..1+86	6.3E-30	4.8E+37	3.2E+4	9.7E+90
1.0E-35	4.2E-105	3..1+101	6.3E-35	4.8E+42	3.2E+9	9.7E+110
1.0E-40	4.2E-120	3..1+116	6.3E-40	4.8E+47	3.3E+14	9.7E+130
1.0E-70	4.2E-210	3..1+206	6.3E-70	4.8E+77	3.2E+44	9.7E+250

Table 2: Energy of field photons and of the total universe as a function of the radius of basic particles.

8. Symmetry and stability

Assuming a positive basic particle to be at the centre of a tetrahedron with the four negative basic particles located at the vertices, the simplest body with a symmetrical spatial charge distribution is obtained as in the proto lepton. Such a symmetrical distribution of charge in three dimensions is apparently a requirement to ensure stability.

For quarks having a fractional charge, a symmetrical spatial distribution of charge is not possible. The only way to form a more stable particle is to team up with one or two quarks in such a way that the charge becomes either zero, or one or two times that of the electron or positron. For mesons that consist of two quarks, this always results in a particle that lacks symmetry in the charge distribution along the axis connecting the two quarks, which may well be the reason mesons are short lived. An interesting aspect of mesons consisting of a quark and its anti-quark is that such mesons can neither be considered matter nor antimatter. The same problem holds for positronium. It would be interesting to investigate the gravitational behaviour of these particles.

For particles consisting of three quarks, more symmetrical configurations are possible than for mesons. This is particularly pronounced for the proton as shown in Fig. 5 An isolated neutron is less symmetric than the proton and this may explain the fact that it is less stable. For simplicity, the particles in Figs. 4, 5 and 6 are given in two dimensions.

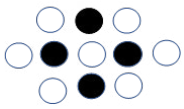

Figure 5: Arrangement of basic particles in a proton.

The heaviest proto-quarks and proto-leptons are the smallest particles where a central basic particle is surrounded by two, three or four basic particles of opposite charge. The proto particles have a very low stability and have to accommodate more photons till they have obtained the flavour of the present matter comprising quarks (*u and d*) and electrons. A two-dimensional example is given in Fig.6 where the proto-lepton is surrounded by “photons”. This results in a more stable symmetric circular (in practice spherical) particle. Given the discrepancy between the proto particles and the classical radii of the currently known quarks and leptons, the existence of many flavours becomes likely.

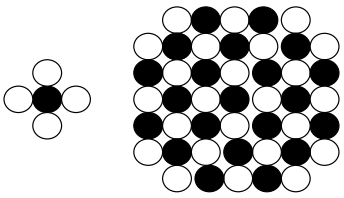

Figure 6: Arrangement of basic particles in a proto-lepton and a lepton

9. Fiels, mass, gravitation and forces

Mass, Coulomb forces and gravitation make themselves manifest by polarisation of the (almost) static photons around bodies. Acceleration of bodies results in more polarisation. In the Big Bang the separation of matter and antimatter started. The fact that the "gravitational" force would have been larger than the Coulomb forces is plausible as smaller particles have a larger mass (*e.g. electron, muon, taon*) whereas charges remain the same.

Mass and therefor energy manifest themselves by polarising the photons in the field. Polarisation is the machinery of the what Eric Verlinde calls information [8]. Inertial mass and gravitational mass lead to the same amount of polarisation and underpin the Equivalence Principle. Both mass and energy are manifestations of the polarisation of photons around bodies which explains their relation. Implicitly this model shows that gravity is an electro-magnetic force. The degree of polarisation is the same for matter and antimatter and the orientation of the field photons is reversed.

10. Euclides and the universe

A problem with all attempts to get a good picture of the universe is that everything is based on "optical" observations whether infrared, radio, x-ray or gamma rays, Optical distances are for two reasons not Euclidean distances. Gravitational lensing implies that there must be an infinite amount of gravitational prisming. That makes it uncertain in what direction an object is located. A faraway object seemingly moving away may be nearby and hardly moving. In such a case the bodies causing the prisms acting as a mirror are moving away with half the velocity measured. The greater the distance, the more serious the uncertainty. Moreover, nowhere space and time are so intertwined as in interpreting optical data. Hence, it is very difficult to get a Euclidian picture of the universe at a certain time. For a good map of the universe a model is required that can then be gauged with observations. In the model the option of a symmetric universe with matter and antimatter must be taken into account.

Conclusions

With a minimum of assumptions, a new view of the universe is given in which only two basic particles are required. The universe starts with low entropy immediately followed by the Big Bang. In the Big Bang the separation between matter and antimatter occurs because matter and antimatter repulse each other. This implies an accelerated expansion of the universe. Further the model explains the machinery for mass, the Coulomb force, gravity, energy and fields.

References

1. Ethan Siegel, Physics International 5 (1): 15-20, 2014 ISSN: 1948-9803 ©2014
2. Maarten J. van der Burgt, Low Entropy Start of the Universe and the formation of Fields and Baryons, IJAP Journal, Vol. 8 Issue 2020
3. R.P. Feynman, R.B. Leighton, R.B. and M. Sands, M.,, "The Feynman lectures on physics", Addison-Wesley publishing company, 1963, pp. 9-6 – 9-9..
4. H.Dittus and CLämmerzahl ,Tests ot he weak equivalence principle for charged particles in space, Advances in Space Research, Vol. 39, Issue 2, 2007, pp. 244-248.
5. Anderson, E.K., . et al. Observation of the effect of gravity on the motion of antimatter. Nature 621, 716–722 (2023). https://doi.org/10.1038/s41586-023-06527-
6. M. J.. van der Burgt, A matter-antimatter universe is bound to expand, IP.com Journal, Vol 8 12A, pp 180, Dec. 2008
7. M. J.. van der Burgt, Accelerated Expansion of a Matter-Antimatter Universe, SSRG IJAP Vol. 8, Issue 1, pp 5-13, 2021
8. S. Perlmutter, Science Magazine Names Supernova Cosmology Project "Breakthrough of the Year", Research News Berkeley Lab. December 17, 1998.
9. E. Verlinde, arXiv:1001.078 5v1 [hep-th] 6 Jan 2010