

A Relativistic Maximum of Light Speed for Escape Velocity

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Abstract

The escape velocity equation shows mathematical parallels between General Gravitational Relativity & Special Relativity Time distortions. Like the light speed limit that SR puts to Real velocity, GR puts a parallel limit to escape velocity. Time Distortion would mean all Bosons are slowed. There is a mathematic argument that General Relativity Graviton slowdown leads to that escape velocity limit – the fundamental escape velocity from any body will never be greater than light speed. The principal equation introduced in this paper is a rephrased GR Time equation. The Escape velocity equation $|v_{esc}=(2GM/r)^{1/2}|$ can also be as written $|v_{esc}^2=(2GM/r)|$.

So $|1 - 2GM/rc^2|$ can be re-expressed as $|1 - v_{esc}^2/c^2|$. It is reasoned the expression will never have a zero value, only a Graviton||Boson slowdown. Time passage would never cease; only approach cessation. Time slowdown predicted by Relativistic distortion is confirmed by muon decay. The different phrasing of the Gravitational Force equation $|F=GMm/r^2|$ would mean a limitless gravitational force. While Bosons compression would be unlimited, any matter could escape after formation absorbing sufficient kinetic energy from slowing Photons||Bosons. This reasoning is illustrated by calculating Classic Relativity interpretations for distortions for Sagittarius A [SA] body at the center of the Milky Way.

Keywords

Relativity, escape, velocity, gravitation, force, nuclear decay, Schwarzschild Limit, antimatter, Sagittarius A

1. Light Speed Limits for Escape Velocities

In Schwarzschild Objects [SO], a combination of Boson slowdown and theoretically infinite Gravitational pressure is a mechanism for energy to fuse into matter. General Gravitational Relativity [GR] distortions must include Gravitons. The different mathematic logic of the equations would mean an unlimited Gravitational Force but a light speed [c] of limit to the escape velocity for the body of greater mass. Reiterating: the maximum velocity moving in free fall to fully escape another body of greater mass is limited c . Energetic matter particles would be able to escape because of the c limit to v_e while Bosons would slow below c .

The escape velocity equation shows parallels between GR & Special Relativity [SR] Time distortions. An alternate grammar for the escape velocity equation:

$$v_e = (2GM/r)^{1/2}$$

Could be:

$$v_e^2 = 2GM/r \tag{1}$$

So the GR Time equation could be rewritten:

$$\text{Time}' = \text{Time}/(1 - 2GM/rc^2)^{1/2}$$

$$\text{Time}' = \text{Time}/(1 - (2GM/r) * 1/c^2)^{1/2}$$

$$\text{Time}' = \text{Time}/(1 - v_e^2 * 1/c^2)^{1/2}$$

$$\text{Time}' = \text{Time}/(1 - v_e^2/c^2)^{1/2} \tag{2}$$

The Time slowdown predicted by Relativistic distortion was recently confirmed by muon decay.¹ So all Bosons would be slowed. It is then reasonable to postulate that General Gravitational Distortion slows Gravitons so escape velocity never goes above light-speed. The above is not a new equation reasoned from the G.R. Time, it is a rephrasing of the original. Using S.R. logic, escape velocity would be limited to light-speed [c]. $|1 - 2GM/rc^2|$ would never have a zero value. Time passage would never cease, only approach cessation.

Because of the difference in equations:

$$\text{Force} = GMm/r^2 \tag{3}$$

– the gravitational force would be reduced, but would not have any theoretic limit. Were the density of energy/matter to spontaneously coagulate in any locale to the density needed for a White Hole to form, it could do so. It would be unlikely, the degree of the unlikelihood dependent on the concentration of energy in that area. Were the density of energy/matter to ever spontaneously coagulate in any locale to the density needed for a White Hole to form, it could do so. It would not require any special event to bring about such a White Hole, simply the passage of enough time.

¹ Measurements of relativistic time dilatation for positive and negative muons in a circular orbit
<http://www.nature.com/nature/journal/v268/n5618/abs/268301a0.html>

2. Consequences of White Hole Formation

Though the spontaneous formation of a White Hole in a pure energy environment would be extremely unlikely, unless there was a concentration of Energy mass in a defined sphere in a degree comparable to a Neutron Star||Pulsar. Remove all time constraints and it is theoretically valid for a White Hole to form spontaneously. The improbability of that is event is unknowable, because while we know what the density of pure free energy at this locale in our reality, we cannot declare absolutely that CMBR density homogeneous throughout our observable [Local] Universe. We also cannot declare against either time procession before the Big Bang or Space beyond what we can observe. There is no theory or evidence as to what preceded the Big Bang: “No one knows how the first space, time, and matter arose.”². To presume all three arose from an absolute nothingness is an unreasonable postulate. But an unknown expanse of a Cosmos of with an undeterminable direction for event procession containing an unknowable matter||energy substance is a worthwhile conjecture. Our reality had to come from somewhere.

So presume a spontaneously formed and compressing Swshwarzchild Object||White Hole coming to be. Very unlikely, but it is more probable that a White Hole at any scale below that of the singular object (the “Cosmic Egg”) that would have had form in order to hatch into a Big Bang. Once that body had formed, Gravitational and Relativistic effects would mean continual acquisition of all varieties of Energy Bosons³, as well as a continual slowdown of those same Energy Bosons. Gravitational effects would further a merge at the centre. The above equations argue limited escape and very significant Boson retention. Though there would be Boson escape in a sense by passing energy onto matter particles captured by that White Hole. The captured matter particles could eventually acquire sufficient kinetic Energy in continuous quantum amounts and escape.

That could also happen in matter free areas, with the spontaneous concentration of Bosons forming a completely White Hole. It could capture any Boson headed for within the Schwarzschild border. That border would expand, capturing more and more Relativistically/Gravitationally slowed Bosons. Because of increasing mass, at any more central radial point within that Schwarzschild border, gravity would increase. That would continually compress captured Bosons. Though gravitational force would be distorted downward, there would not be the same limit that escape velocity would have. Relativistic slowdown and gravitation force increase would lead to denser and slower Bosons, to the point it can be theorized it could eventually form into matter. The formation of matter versus antimatter would initially be equally probable, but this paper proposes when a significant proportion of either form, it acts as a nuclear catalyst for the production of more. The reader is invited to consider the validity of the above against a proposal for spontaneous and random matter formation majority in an expanding body of pure energy.

Non-Black Schwarzschild Objects like the bright Abell 2261 Galaxy Cluster add to that argument. Brightness caused primarily by descending captured matter would mean that the signal would be Red-Shifted by Gravity; by the withdrawal velocity of the captured matter away from us it and by high Relativistic effects at the border of the object. An extremely good image of the very bright Abell 2261 object is at the NASA Internet site⁴:

<http://www.spacetelescope.org/images/heic1216a/>.

Bosons can be proposed to be more a fundamental state of reality than matter when a valid mechanism for conversion of Bosons to matter particles through Relativistic forces is reasoned. There are mechanisms for Matter manufacture in both SR and GR. The evidence of the universality of those Bosons for matter manufacture is a simple, compelling one: the CMBR. The normal state of our Universal Cosmos being a dispersal of pure energy agrees with the principle

² UNIVERSEFORUM - Produced for NASA for the Harvard Smithsonian Center for Astrophysics; “Where did the Universe Come from?” https://www.cfa.harvard.edu/seuforum/bb_whyare.htm

³ Measurements of relativistic time dilatation for positive and negative muons in a circular orbit <http://www.nature.com/nature/journal/v268/n5618/abs/268301a0.html>

⁴ HUBBLE SPACE TELESCOPE, Galaxy Cluster Abell 2261 http://www.nasa.gov/mission_pages/hubble/science/a2261-bcg.html

of entropy more than the order a single matter particle would bring. The most orderly, least entropic object in our view of our local, visible Universe's history can be argued to be the singular object (whatever its dimensions) exploding in the first Big Bang.

How the formation of that singular object came about is very much under debate, so this writer will not attempt to credit (or discredit) any of those propositions. Though simply pose to the reader this question: which is the more reasonable supposition as to the beginning of the finite space around us to form into our Local Universe?

- a) A infinite expanse of energy with a Relativistic mechanism for converting that energy into matter. In an extremely unlikely circumstance a block of that energy concentrates enough to form a Schwarzschild Object. The probability is unimportant because the expanse is infinite in time and space. Either flavor of matter|antimatter acts as a catalyst for more of the same. The only evidence we have of the finite nature of our Local Universe are observations made over a very tiny portion of the time limits proposed by current theory. Those observations were also taken from an infinitesimal proportion of the space in our reality. The newly formed matter|antimatter would eventually acquire sufficient kinetic energy for complete radiation because escape velocity would always be below light speed.

- Or -

- b) The explosion of an unobserved object with no currently confirmed mechanisms for its formation or causes for its explosion within a finite expanse at a hyper-relativistic speed. And our observations of those finite limits have broadened for the entire history of our thinking and science.

The SR time $[\text{Time}' = \text{Time}/(1 - v^2/c^2)^{1/2}]$ expression is currently seen to dictate a slowing time. The Relativistic velocity shift it puts on Photons has been experimentally confirmed⁵. The Relativistic increases of a matter object's mass approach infinity as the velocity of that object approaches c . That would mean the fundamental properties of matter would change (both nuclear and chemical) as the Atomic Mass of individual atoms changes in proportion to their Atomic Number. To the same degree, the forces/energy that dictated the reactions between Nucleon/Atom/Molecule objects would slow & weaken.

The principle Hydrogen isotope – ^1H – has an atomic mass of 1.007825⁶. That is a fundamentally different nucleic structure from the principle Iron isotope – ^{56}Fe – with an atomic mass of 55.934939⁷. A velocity of approximately 2.59627884E8m/s means a distortion factor of 2.0. Accelerated to that velocity would mean the mass of individual nucleons would be doubled while the mass of Bosons is halved. Would the interactions of ^1H with an atomic mass of 2.015650 (or ^{56}Fe with an atomic mass of 111.8699) be exactly the same, only slower? Doubling the nucleon mass and halving Gluon velocities to 149,896,229m/s? Deuterium has an approximate doubled mass but it could not be argued the distorted ^1H would be exactly like the undistorted ^2H . Distorted Hydrogen would have slowed electrical force with that doubled mass. There are no doubled atomic mass isotopes of iron – they don't exist in our non-Relativistic world. The increased mass of the particles, combined with the slowing/weakening of the Bosons that maintain their structure (the repellant force of positive charges in the Protons and the binding Strong Nuclear Force Gluons) could lead to the breakdown to lower atomic numbered elements.

That argument can be made of General Relativistic effects. Though the mass of matter particles would not be increased in the same proportionality to distortion as in Special Relativity, it would increase because of the slowed Bosons around it. The structure of nucleons/atoms/molecules comes about through the interaction of their matter masses and the Gravity/Photon/Gluon/X|Y Bosons forces around them. The increase in mass of the matter particles

⁵ "Special relativity aces time trial", Nature, August, 19 September 2014, <http://www.nature.com/news/special-relativity-aces-time-trial-1.15970>

⁶ National Institute of Standards and Technology, Hydrogen (H), <http://physics.nist.gov/PhysRefData/Handbook/Tables/hydrogentable1.htm>

⁷ National Institute of Standards and Technology, Physical Meas. Laboratory, Iron (Fe), <http://physics.nist.gov/PhysRefData/Handbook/Tables/irontable1.htm>

and the slowdown all Bosons would mean a fundamental change in the structure of matter. Conservation of energy could be used to argue that the number of Bosons would increase so as to maintain the force of the gravitational pull. But those Bosons would also be going at half the pace they went when not under distortion. Energy is a function of force over a given distance. Because of the slowed pace of the Bosons fewer would interact over a given time period than the ones undistorted. At any given moment, there would be less energy. But the slowed pace would mean that the Energy from those bosons would be stretched over a longer time period. At 2.59627884E8m/s, the energy at any point in time and space would be half what it was at rest. But the time for that energy would last twice as long. So the gravity would be half what it what it would be under no distortion.

3. Reasoning Escape Velocity Limits with an Observed Phenomenon

The limits declaration will be argued with current Schwarzschild Object [S.O.] equations against a known S.O. to illustrate the incompleteness and inconsistency of those equations. Values for the mass of defined objects are assumed as precise to 50 decimal places. Invalid in a number of cases, but it is sometimes necessary to establish theoretic principles, those in this paper included. The principles do not require precision to establish, simply consistency:

$$\text{Gravitational_Constant}^8 = G = 6.67384800\sim00\text{E}\text{-}11 \text{ m}^3\text{kg}^{-1} \text{ s}^{-2}$$

$$\text{Mass_Sun}^9 = 1.988500\sim00\text{E}30\text{kg}$$

The mass of the largest S.O. in our Galaxy is assumed to be the Sagittarius A¹⁰ [SA] object formed at the Core of the Milky Way, with a Right Ascension of 17^h 45^m 40.0409^s and a Declination of -29° 0' 28.118". The SA object is being used as an illustration, not a Theoretic proof.

$$\text{Mass_SA}^{11} = 4.3100\sim00\text{E}6 * \text{Mass_Sun} \tag{4}$$

$$\text{Mass_SA} = 8.5706505\sim00\text{E}36\text{kg}$$

Determining the Schwarzschild radius from that estimated mass -

$$\text{Schwarzschild_SA} = 2 * G * \text{Mass_SA} / c^2 \tag{5}$$

$$\text{Schwarzschild_SA} = (2 * 6.67384800\sim00\text{E}\text{-}11 \text{ m}^3\text{kg}^{-1} \text{ s}^{-2} * 8.5706505\sim00\text{E}36\text{kg}) / (299792458 \text{ m s})^{-2}$$

$$\text{Schwarzschild_SA} = 1.27285275203225548390675120034832177678110953867744\text{E}10\text{m}$$

⁸ George T. Gillies (1997), "The Newtonian gravitational constant: recent measurements and related studies", *Reports on Progress in Physics* **60** (2): 151–225, Bibcode:1997RPPh...60..151G, doi:10.1088/0034-4885/60/2/001.

⁹ Williams, D. R. (1 July 2013). "Sun Fact Sheet". NASA. Retrieved 12 August 2013.

¹⁰ Eisenhauer, F.; et al. (23 October 2003). "A Geometric Determination of the Distance to the Galactic Center". *The Astrophysical Journal* **597**

¹¹ Gillessen, Stefan et al. (23 February 2009). "Monitoring stellar orbits around the Massive Black Hole in the Galactic Center". *The Astrophysical Journal* **692** (2): 1075–1109. Bibcode:2009ApJ...692.1075G. doi:10.1088/0004-637X/692/2/1075.

Under Classic Relativity theory, the distortion at the exact border of the S.O. would be infinite. We will assume ideal: a non-Relativistic single second. The time distortion 1 Planck Length ($1.61629900 \times 10^{-35} \text{m}^2$) beyond the S.O. would be:

$$\text{Time_Distortion_Schwarzschild_SA_Plus_Planck_Length} = 1 / (1 - 2 * \text{Gravitational_Constant} * \text{Mass_SA} / \sim (\text{Schwarzschild_SA} + l_p) * c^2)^{1/2} \quad (6)$$

$$\text{Time_Distortion_Schwarzschild_SA_Plus_Planck_Length} = 1 / (1 - 2 * 6.67384800 \times 10^{-11} \text{ m}^3 \text{kg}^{-1} \text{ s}^{-2} * 8.15305500 \times 10^{-36} \text{kg} / (1.272 \times 10^{-10} \text{m} + 1.61629900 \times 10^{-35} \text{m}) * c^2)^{1/2}$$

$$\text{Time_Distortion_Schwarzschild_SA_Plus_Planck_Length} = 2.8063228692076047341953864321857298625191 \sim 9661087977 \text{E}22 \text{m}$$

The Time distortion 1 full metre out is:

$$\text{Time_Distortion_Schwarzschild_SA_Plus_1_Metre} = (1 - 2 * \text{Gravitational_Constant} * \text{Mass_SA} / \sim (\text{Schwarzschild_SA} + 1.00 \times 10^{-00} \text{m}) * c^2)^{1/2} \quad (7)$$

$$\text{Time_Distortion_Schwarzschild_SA_Plus_1_Metre} = (1 - 2 * 6.67384800 \times 10^{-11} \text{ m}^3 \text{kg}^{-1} \text{ s}^{-2} * 8.15305500 \times 10^{-36} \text{kg} / (1.272 \times 10^{-10} \text{m} + 1.0 \times 10^{-00}) * c^2)^{1/2}$$

$$\text{Time_Distortion_Schwarzschild_SA_Plus_1_Metre} = 1.128207761067196117658259878838033924709 \sim 98556057620 \text{E}5$$

The Proportion of those distortions is:

$$\text{PROPORTION_Distortions} = \text{Time_Distortion_Schwarzschild_SA_Plus_Planck_Length} / \sim \text{Time_Distortion_Schwarzschild_SA_Plus_1_Metre} \quad (8)$$

$$\text{PROPORTION_Distortions} = 7.49067 \times 10^{-44} / 1.128 \times 10^{20} \text{E}5$$

$$\text{PROPORTION_Distortions} = 2.20475060018255306932356205067543965143504537301659 \text{E}12$$

In contrast, let us compare the Gravitational forces between the two points:

$$\text{Gravitational_Force_Schwarzschild_Border_SA} = (1 - 2 * \text{Gravitational_Constant} * \text{Mass_SA} / \sim ((\text{Schwarzschild_SA} + l_p) * c^2)^{1/2} \quad (9)$$

$$\text{Gravitational_Force_Schwarzschild_Border_SA} = (6.6738480 \times 10^{-11} \text{ m}^3 \text{kg}^{-1} \text{ s}^{-2} * 8.1530550 \times 10^{-36} \text{kg}) / \sim (1.21068 \times 10^{-10} \text{m} + 1.6161999700 \times 10^{-35} \text{m})^2$$

$$\text{Gravitational_Force_Schwarzschild_Border_SA} = (3.711772274890199586456777417144170173 \sim 7277653584 \text{E}6 \text{m/s}$$

¹² The NIST Reference on Constants, Units and Uncertainty; Planck Length; <http://physics.nist.gov/cgi-bin/cuu/Value?plkl>

At one Metre the distortion would be:

$$\text{Gravitational_Force_Schwarzschild_SA_Plus_1_Metre} = (1 - 2 * \text{Gravitational_Constant} * \text{Mass_SA} / \sim (\text{Schwarzschild_SA} + 1.00000\sim 00000\text{E}0) * c^2)^{\frac{1}{2}} \quad [10]$$

$$\text{Gravitational_Force_Schwarzschild_SA_Plus_1_Metre} = (6.6738480\sim 0\text{E}\sim 11 \text{ m}^3\text{kg}^{-1} \text{ s}^{-2} * 8.1530550\sim 0\text{E}36\text{kg} / \sim (1.21068\sim 26421\text{E}10 \text{ m} + 1.00000\sim 00000\text{m})^2)$$

$$\text{Gravitational_Force_Schwarzschild_SA_Plus_1_Metre} = 3.711772274277029114902988605385146345\sim 6506480279\text{E}6\text{m/s}^2$$

The difference between those two values:

$$\text{DIFFERENCE_GRAVITATIONAL_FORCES} = \text{Gravitational_Force_Schwarzschild_Border_SA} - \sim \text{Gravitational_Force_Schwarzschild_Border_SA_Plus_1_Metre} \quad [11]$$

$$\begin{aligned} \text{DIFFERENCE_GRAVITATIONAL_FORCES} = \\ 3.71177227489019958645677741714417017372776535843664\text{E}6\text{m/s}^2 - \sim \\ 3.71177227427702911490298860538514634565064802791866\text{E}6\text{m/s}^2 \end{aligned}$$

$$\text{DIFFERENCE_GRAVITATIONAL_FORCES} = 6.1317047155378881175902382807711734042836\sim 2310702818\text{E}\sim 4\text{m/s}$$

So what current theory is contending is that a difference in Gravitational force of 6.131~818E-4m/s is reasonable with a prediction of a 6.187~379E34 change in Relativistic distortion – with an infinite distortion a single Planck Length farther in towards the centre of the S.O.

The numbers above argue that the maximum escape velocity that any body can approach, whatever it's mass or radius, is |c| - light velocity. The General Relativity escape velocity limit would parallel the Special Relativity velocity limit very closely. This would have great implications for the mechanisms and dimensions of Big Bangs, of Cyclic Catastrophes or Steady State realities. This writer contests almost all of the current estimates for the dimensions of the first Big Bang. That is not at all because it would be impossible for such scale events to occur – simply very unlikely. These issues are argued much more cogently and specifically in other papers. The principal point of this paper was to argue for the existence of different additional equations to current Relativity Theory that agree exactly with the originals mathematically.

The consequences of the above for the SA object would be that the combination of its gravitation pull and its Relativistic distortion of Photons||Bosons would mean that it would capture more energy than it expelled. The captured Photons||Bosons would be drawn more and more closely to the centre. The increased Relativistic effects would mean that Photons||Bosons would slow down and conservation of Energy would mean they would multiply in number.

4. Matter||Antimatter production through Compression and Nucleic Catalytic effects

It is known that antimatter particle creation can come about through the collision matter particle. So a combination of energy (the Kinetic energy of the colliding particles) and subatomic particles can produce antimatter and matter particles. The likelihood of those collisions producing antimatter is unknown, because experimental verification of the number of actual matter particles in the beam can never be achieved because of uncertainty effects.

The key point in the above is that the only currently known methods now to create anti-particles are catastrophic. The production of matter (or antimatter) through compression has never been observed. But that method can be theorized. In particle collisions, the action immediately after that collision is for any produced particles to separate at Relativistic velocities. They have no interaction other than that collision.

Consider the alternate: pure energy being compressed to theoretic Planck scale dimensions. If the argument mathematically reasoned from Classic General Relativity equation were valid, the escape velocity would never reach light speed and then there would be no “imaginary” limit to distortion. The distortion would increase on a square root curve, never reaching infinity. Bosons would both decrease in speed||energy, and because of matter/energy conservation increase in number. The density would have no limits, aside from the Planck dimensions. Now comes the first purely theoretic postulate (not like the others that were directly reasoned from current theory||equations) in this paper. If the particles coming to be through compression and Relativistic effects from energy to matter/antimatter conversion were always exactly balanced, neither flavour would gain the matter dominance we observe in our Local Universe. Exactly balanced articles created from compressed/slowed Boson substance would continually annihilate each other.

So hypothesize that either flavour acts as a nuclear catalyst for the creation of more. Considerable more analysis and research is needed for confirm the details of this postulate. But it is reasonable to theorize that either matter or antimatter acts as a promoter for conversion from energy into more of the same. Presume an infinite reality, and it is not even necessary to establish a density, number, or mass of particles needed for the state of nuclear catalysis to consistently produce more of the same matter flavour. The infinity proposition would simply mean that it would have to happen eventually. That proposition would also mean that there could be other antimatter realities we do not currently detect. It would even be consistent with one of the current suggestions that other observable Galaxies are antimatter in construct¹³.

This researcher refuses to make any absolute declarations on that issue, though he does admit to the reader his personal leanings are towards matter||antimatter stellar organizations on the scale of our observable Local Universe. That is, that all of the bodies currently being observed define the absolute minimum size to our Local matter Universe, though not necessarily its full extent. In an infinite Cosmos, the proposal made in this paper does not at all deny the possible existence of Local antimatter Universes. Resolution to Galactic||Local Universe scales to the matter vs. antimatter alternatives may take decades of research and theorizing – or millennia of the same. Standing by the infinity declaration, it is not really certain the question that could be answered with absolute Scientific Mathematical worth. But this writer absolute admits ignorance on the issue.

¹³ Close, F. E. (2009-01-22). *Antimatter*. Oxford University Press US. p. 114. ISBN 0-19-955016-6

5. Inconsistent Distance and Approach of the M31 Andromeda Galaxy

The only data item for the expansion of our Local Universe is the Red shift observed in objects at inter-Galactic distances. But an inconsistency of that is the approaching velocity of the Andromeda Galaxy [M31]. Its distance from the Milky Way is 7.8500~00E2 kiloparsec¹⁴. So its distance in Mega Parsecs [M31_Distance_{MP}] would be 1/1000 that: 7.8500~00E-1Mpc

The Hubble Constant is currently believed to be:

$$\text{Hubble}_{\text{Constant}} = 69.3200\sim00(\text{km/s})/\text{Mpc}^{15} \quad (12)$$

So its recession velocity [M31_Recession_{Velocity}] should be:

$$\text{M31_Recession}_{\text{Velocity}} = \text{M31_Distance}_{\text{Parsec}} * \text{Hubble}_{\text{Constant_km/s}} \quad (13)$$

$$\text{M31_Recession}_{\text{Velocity}} = 6.93200\sim00\text{E}1(\text{km/s})/\text{Mps} * 7.85\text{E}-1 \text{ Mpc}$$

$$\text{M31_Recession}_{\text{Velocity}} = 5.4416200\sim00\text{E}4 (\text{km/s})$$

The actual velocity of M31 is considerably more in an opposite vector: 301±1 km/s¹⁶ [M31_{Velocity}] towards the MW. There could be an argument made that the two bodies had some separating velocity in the early moments of the Universe, but for this simple fact. The mass of M31 is thought to be more or less equivalent to that of the MW, that of 1.0E12 Solar Masses¹⁷ [MW_{Solar_Masses}]

As the mass of the Sun [Mass_{Sun}] is widely estimated to be 1.9885E30kg¹⁸, that would mean both Galaxies massed:

$$\text{Mass}_{\text{MW}} = \text{Mass}_{\text{Sun}} * \text{MW}_{\text{Solar_Masses}} \quad (14)$$

$$\text{Mass}_{\text{MW}} = 1.988500\sim00\text{E}30 * 1.0\text{E}1200\sim00$$

$$\text{Mass}_{\text{MW}} = 1.9885\text{E}42 \text{ kg}$$

¹⁴ A. W. McConnachie, M. J. Irwin, A. M. N. Ferguson, R. A. Ibata, G. F. Lewis, N. Tanvir “Distances and Metallicities for 17 Local Group Galaxies”; Monthly Notices Royal Astronomic Society.356:979-997,2005;

<http://mnras.oxfordjournals.org/content/356/3/979.full?sid=1a570508-7670-42a8-af78-b4879a80e7cb>

¹⁵ “Nine-Year Wilkinson Microwave Anisotropy Probe (WMAP) Observations: Final Maps and Results” <http://arxiv.org/pdf/1212.5225v3.pdf>.

¹⁶ Karachentsev, I. D.; Kashibadze, O. G. (2006). "Masses of the local group and of the M81 group estimated from distortions in the local velocity field". *Astrophysics* **49** (1): 3–18. Bibcode:2006Ap.....49....3K. doi:10.1007/s10511-006-0002-6.

¹⁷ Karachentsev, I. D.; Kashibadze, O. G. Ibid.

¹⁸ Dr. David R. Williams, “Sun Fact Sheet” <http://nssdc.gsfc.nasa.gov/planetary/factsheet/sunfact.html>

Since the distance of a Parsec[pc] is $3.08568E16m^{19}$, a Megaparsec [Mpc] would be is $3.08568E22m$. So the distance between M31 and the MW is:

$$\text{Distance_M31}_{\text{Metres}} = \text{M31_Distance}_{\text{MP}} * \text{Mpc} \quad (15)$$

$$\text{Distance_M31}_{\text{Metres}} = 7.8500\sim00E-1\text{Mpc} * 3.0856800\sim00E16\text{m/Mpc}$$

$$\text{Distance_M31}_{\text{Metres}} = 2.422258800\sim00E22\text{m}$$

So the Escape velocity between the two bodies would be:

$$\text{Escape}_{\text{MW}} = (2 * G * \text{Mass}_{\text{MW}} / \text{Distance_M31}_{\text{Metres}})^{0.5} \quad (16)$$

$$\text{Escape}_{\text{MW}} = (2 * 6.67384E-11 * 1.98850E42\text{kg} / 2.422258800\sim00E22\text{m})^{0.5}$$

$$\text{Escape}_{\text{MW}} = 1.04691160385258652287668852191755574063384243119569E5\text{m/s.}$$

The proportion of the actual velocity to escape velocity would be

$$\text{Proportion}_{\text{Escape_Velocity}} = \text{Escape}_{\text{MW}} / \text{M31}_{\text{Velocity}} \quad (17)$$

$$\text{Proportion}_{\text{Escape_Velocity}} = 3.01000\sim00E5\text{m/s} / 1.0469\sim569E5\text{m/s.}$$

$$\text{Proportion}_{\text{Escape_Velocity}} = 2.87512335227094486433516648533090714315790464528012E0$$

So M31 is approaching the MW at more than $2\frac{1}{2}$ times their mutual escape velocity, in an “expanding” Universe. The escape velocity would be even less than the above since distance used for the escape equation above is even greater; the distance referred to is the distance between both objects centre of gravity. But both objects are so disperse, that the centre of gravity is a debatable issue. The above is the absolute maximum escape velocity; they may be mutually approaching at a much greater proportion of the real value that would come to be with the interaction of two such dispersed objects. Is that not another argument for frequency decay because of the Local Universe Cosmosphere as an explanation as opposed to a Hubble Reality? M31 is simply moving towards us at a velocity too high to be overcome by Cosmo-spheric frequency shift. The complete argument is made in greater detail in the paper: **Frequency Decay Through Electromagnetic Radiation Absorption and re-Emission by Inter-Galactic Dark Matter as an Alternate Explanation For the Hubble Constant.** There is a preliminary copy of that paper in the **Alternative archive of e-prints in Science and Mathematics** at <http://vixra.org/abs/1506.0108>.

¹⁹ DICTIONARY OF GEOPHYSICS, ASTROPHYSICS, and ASTRONOMY, CRC Press,
<http://www.deu.edu.tr/userweb/emre.timur/dosyalar/Dictionary%20of%20Geophysics,%20Astrophysics%20and%20Astronomy.pdf>

4.0 Summary

Like “Real” velocity in Special Relativity, escape velocity is limited to a maximum of light speed under General Relativity restrictions. That would mean that General Relativistic distortion could approach infinity, but never reach it. Currently reasoned Relativistic effects could not bring about an “imaginary” state of reality. The Real gravity of any body could never do more than approach infinity. The gravity would be reduced by Relativistic affects though not to any definable value. The point of this paper was not to dismiss the value of Relativity Theory, but to identify some of the incompletions in its mathematic reasoning. This point will be argued much more thoroughly and mathematically in following papers that argue how Relativistic effects would be perceived from the perspective of the moving\distorted object.

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Equations

- (1) $v_e^2 = 2GM/r$
- (2) $\text{Time}' = \text{Time}/(1 - v_e^2/c^2)^{1/2}$
- (3) $\text{Force} = GMm/r^2$
- (4) $\text{Mass_SA} = 4.3100 \times 10^6 * \text{Mass_Sun}$
- (5) $\text{Schwarzschild_SA} = 2 * G * \text{Mass_SA} / c^2$
- (6) $\text{Time_Distortion_Schwarzschild_SA_Plus_Planck_Length} = 1 / (1 - 2 * \text{Gravitational_Constant} * \sim \text{Mass_SA} / (\text{Schwarzschild_SA} + l_p) * c^2)^{1/2}$
- (7) $\text{Time_Distortion_Schwarzschild_SA_Plus_1_Metre} = (1 - 2 * \text{Gravitational_Constant} * \text{Mass_SA} / \sim (\text{Schwarzschild_SA} + 1.00 \times 10^{-10} \text{m}) * c^2)^{1/2}$
- (8) $\text{PROPORTION_Distortions} = \text{Time_Distortion_Schwarzschild_SA_Plus_Planck_Length} / \sim \text{Time_Distortion_Schwarzschild_SA_Plus_1_Metre}$
- (9) $\text{Gravitational_Force_Schwarzschild_Border_SA} = (1 - 2 * \text{Gravitational_Constant} * \text{Mass_SA} / \sim ((\text{Schwarzschild_SA} + l_p) * c^2)^{1/2}$
- (10) $\text{Gravitational_Force_Schwarzschild_SA_Plus_1_Metre} = (1 - 2 * \text{Gravitational_Constant} * \sim \text{Mass_SA} (\text{Schwarzschild_SA} + 1.00000 \times 10^{-10} \text{m}) * c^2)^{1/2}$
- (11) $\text{DIFFERENCE_GRAVITATIONAL_FORCES} = \text{Gravitational_Force_Schwarzschild_Border_SA} \sim \text{Gravitational_Force_Schwarzschild_Border_SA_Plus_1_Metre}$
- (12) $\text{Hubble_Constant} = 69.32(\text{km/s})/\text{Mpc}$
- (13) $\text{M31_Recession_Velocity} = \text{M31_Distance_Parsec} * \text{Hubble_Constant_km/s}$
- (14) $\text{Mass_MW} = \text{Mass_Sun} * \text{MW_Solar_Masses}$
- (15) $\text{Distance_M31_Metres} = \text{M31_Distance_Mpc} * \text{Mpc}$
- (16) $\text{Escape_MW} = (2 * G * \text{Mass_MW} / \text{Distance_M31_Metres})^{1/2}$
- (17) $\text{Proportion_Escape_Velocity} = \text{Escape_MW} / \text{M31_Velocity}$