# THE MUSEUM APPLICATIONS OF EINSTEINIAN SPACE/TIME GEOMETRY

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Abstract - The effect of two adaptations of Einstein's formulae on museum theory and practice are discussed. In the first case, the profound advances in accelerated ageing of samples are described, and in the second the value of transporting objects to the vicinity of black holes is examined in terms of their increased longevity.

## 1 Introduction

The impact of Einstein's theories of Relativity (1) upon his contemporaries and, more important, upon the general public, was far from profound and it was not until the middle decades of his century that incontrovertible proofs began to accumulate in sufficient numbers to convince even the sceptics among his immediate predecessors. In fact, until the convincing demonstration using atomic clocks by Carroll Alley in 1976 of the concrete relationship between time and gravity, many of his fundamental precepts could still be held to question. This apparent ambivalence within the scientific community was due directly to the fact that Newton's laws of mechanics still provided a sufficiently accurate interpretation of celestial events - indeed, the slight inaccuracies that einsteinian mechanics introduced into most early space travel were so negligible as not to require calculation. For example, the additional mass added by the einsteinian equations to a space craft during a flight to the moon amounts to no more that a few hundredths of a gram and could thus be ignored.

In view of these slight physical effects in the vicinity of earth-like masses and at comparatively small fractions of the speed of light, it is scarcely surprising that the impact of these formulae on the museum world was hardly felt. Even had museums in that century been the most extroverted and modernistic (which they most certainly were not) they could hardly have made use of such exotic and esoteric material for the enlightenment of their visitors or for the care of their collections. Within our own century this has, of course, changed but, significant to the museum context, it required the introduction of a far-reaching practical application to bring this about. The way for this practical application was paved by two adaptations to the hitherto unchallenged Einstein equations.

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## 2 The Altenburg/Vejvanofsky Relationship

This inversion of a third order relationship within the workings of Special Relativity (2) proved to almost paradoxically overturn one fundamental concept of einsteinian mechanics and, at the same time, provide a vital proof of their ultimate durability. This is not the place to enter into complex mathematical details, but a brief synopsis for museum intellects follows:

If

$$M_J = (10^{-6})^{3/2} \times 5 \times 10^{18}\, M_\odot = 1.6 \times 10^{3} M_\odot \qquad ..1$$

And

$$\frac{(TR)_{after}}{(TR)_{before}} = \left(\frac{11}{4}\right)^{1/3} = 1.401 \qquad ..2$$

When

$$u = \frac{8\pi^5 (kT)^4}{15(hc)^3} = 7.56464 \times 10^{-15}\,[T(^\circ \mathrm{K})]^4 \ \mathrm{erg/cm^3} \qquad ..3$$

Then

$$du' = \frac{1}{f^4}\, du = \frac{8\pi hc}{\lambda^5 f^4}\, d\lambda \Big/ \left[e^{\left(\frac{hc}{kT\lambda}\right)} - 1\right] \qquad ..4$$

But, unfortunately

$$(T/T_s)_{after} = \frac{(TR)_{after}}{(T_sR)_{after}} = \left(\frac{11}{4}\right)^{1/3} = 1.401 \qquad ..5$$

Never mind, because

$$\frac{11}{2}(TR)^3_{before} = 2(TR)^3_{after} \qquad ..6$$

So

$$du = \frac{8\pi kT}{\lambda^4}\, d\lambda \qquad ..7$$

And

$$E_{average} = u/N = 3.73 \times 10^{-16}\,[T(^\circ \mathrm{K})]\ \mathrm{ergs} \qquad ..8$$

Therefore

$$t_1 - t_2 = \frac{2}{n}\sqrt{\frac{3}{8\pi G}}\left[\frac{1}{\sqrt{\rho(t_1)}} - \frac{1}{\sqrt{\rho(t_2)}}\right] \qquad ..9$$

As long as

$$E = P.E. + K.E. = mR^2\left[\frac{1}{2}H^2 - \frac{4}{3}\pi\rho G\right] \qquad ..10$$

And

$$M = \frac{4\pi R^3}{3}\rho \qquad ..11$$

Finally

$$\frac{1}{2}\sqrt{\frac{3}{8\pi(6.67 \times 10^{-8}\ \mathrm{cm^3/gm\ sec^2})(9.9 \times 10^{-31}\ \mathrm{gm/cm^3})}} = 2.1 \times 10^{18}\ \mathrm{sec} = 680{,}000\ \mathrm{years} \qquad ..12$$

See?

Suffice it to say that certain fixed values proved to be in error with regard to the concept of time in relationship to both gravity and absolute velocity. The idea of defining

velocity in absolute terms had long been abhorent to mathematicians but it gradually became apparent that, as time slowed relative to velocity and gravity until at light speed or at the event horizon of a black hole it effectively stopped to an external viewer, so at some place in the Universe the opposite situation should obtain. At a point of no absolute velocity and a complete absence of gravity the passage of time should, according to Altenburg and Vejvanofsky's calculations, have the value of infinity when seen from outside. Only one place in the Universe could possibly possess these particular characteristics, this being the single point from which the Big Bang originated. In zones concentric to the Singularity of Bang (SOB) time is greatly accelerated until at the singlarity itself it ceases to have a value and thus a meaning. The recent confirmation of the hypothesis in the positive identification of the SOB by the Graviton Detection Monitor on Pluto as a point some 12 billion light years distant in the direction of the constellation Camelopardus (Figs. 1&2) has had enormous repercussions.

*Figure 1 The exact location of the Singularity of Bang in the constellation Camelopardus is obscured by the massed stars of our own galaxy.*

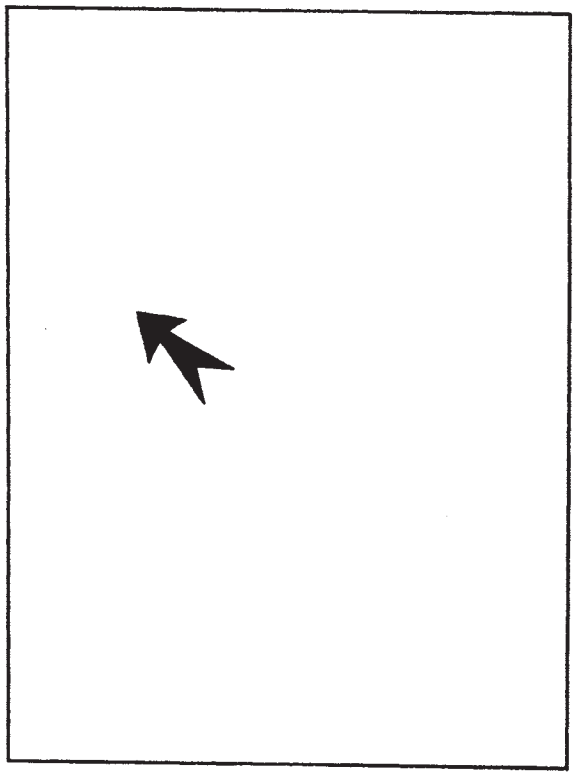

*Figure 2 In this negative photograph the obscuring stars of our galaxy have been electronically removed. (By its very nature the Singularity is, of course, completely invisible.)*

## 3 The Bendinelli/Fantini Concept

This second, and perhaps more far-reaching reading of einsteinian space/time theory came about only recently (3) when the concept of simultaneity at light speed was found to be equally applicable, under certain conditions of high magnetic flux, at lower comparative velocities and at discrete locations in space and time. An idea of the calculations can be gained by reading the equations shown previously in the following order:

6,7,1,4,11,9,12,3,2,8,5,10

The result will be:

$$u = \int_0^{\infty} \frac{8\pi hc}{\lambda^5} d\lambda \Big/ \left(e^{\left(\frac{hc}{kT\lambda}\right)} - 1\right) \quad ..13$$

Clearly then, the transmission of inanimate matter between discrete points in space/time instantaneously became theoretically possible and practically obtainable. A facility for the exploitation of this revolutionary new concept was established on Monteverdi (near Gabrieli) and this became known as the Matter Displacement Facility (or "matter mitter" to

the vulgar press)(4). With the high regard for museums that this century possesses it was only natural that they would be given the first benefits from the completed facility.

The application of the Simultaneity Concept and the Altenburg/Vejvanofsky Relationship to the care and scientific examination of works of art is outlined in the following two sections.

## 4 Accelerated Ageing by Time Shell Placement

The effects of the environment on museum objects have been well known for over two centuries and as early as 1978 Thomson (5) had made a masterly, although now very dated, summary. During examination of the causes of deterioration in works of art it had been necessary in Thomson's time (and until very recently) to subject materials to a somewhat suspect process of accelerated ageing. This required *inter alia* massive and rapid cycling of relative humidity and exposure to extremely high light levels. Results from these exposures were then extrapolated to give rough and ready figures for deterioration over real time. It had long been understood by conservation scientists that the only truly accurate way to determine the ageing characteristics would be to expose the material to exactly the conditions it would enjoy in the ideal museum environment, and then to dramatically accelerate time in its locality. This long desired situation is now feasible using the facility on Monteverdi. Museum material to be tested is enclosed in a portable environmental chamber which has a self contained nuclear power supply and extremely durable and long-lasting components. The chamber is then displaced to a locality within a chosen 'time shell' around the SOB and left in place for a duration appropriate to its position - by an inverse relationship, the closer the chamber is positioned to the SOB the less exposure time is required to give an equivalent result. By this reasoning if the chamber was placed exactly at the SOB itself an exposure to eternity would take no time at all. The advantages of this technique over those of conventional accelerated ageing are manifest. In tests to date excellent results have been obtained in the yellowing of varnishes and the fading of pigments.

## 5 Storage on Event Horizons

The intriguing properties of black holes became more than mere abstract playthings for cosmologists when a strong radio and x-ray source in Virgo (M87) became identified in 1978 as resulting from matter funnelling into a black hole. More such sources came to be discovered and described (6) and refinements to Joseph Weber's apparatus * were at last able to detect the gravitational radiation which is now identified with the super-massive black hole at the centre of our own galaxy. The properties of the black hole event horizon had, of course, been predicted by the einsteinian equations and in the year 1917 Schwarzchild proposed the first mathematical model. In short, an object positioned at the Schwarzchild radius of a black hole - its event horizon - would exist to the external world in a state of stasis. Time would cease to pass for the object. With the Monteverdi device it is now possible to place objects repeatedly and accurately upon event horizons situated at any distance (although the concept of distance is faulty under these conditions).

The implications of placing an object at, or near, an event horizon are enormous and an experimental placing of such an object was carried out recently to validate the technique. The argument that the object would be crushed and distorted by the high tidal gravitational potential is fallacious. The artifact is placed instantaneously upon the event horizon and during its tenure there no time elapses and therefore no damage can possibly take place. Clearly, positioning exactly at the event horizon is crucial, but by no means practically difficult.

Following successful retrieval of the object - a Fanfare Trumpet by Wolf Wilhelm Haas of Nürnberg - a new museum concept has been devised. Individual vitrines have been fitted with miniature versions of the Matter Displacement device so that both they and their contents can be displaced to the vicinity of a newly discovered black hole in the constellation Sagitarius (Fig. 3). When wishing an examination of the object the museum visitor simply depresses a button which activates the re-call power supply, causing the desired vitrine to occupy a space immediately in front of him. When the examination is completed the vitrine and the object are returned to their stasis on the event horizon of the Sagitarius black hole. It has been reliably shown (7) that an object is under

*When Joseph Weber claimed in the late 1960's to have identified gravity waves his results were hailed by theorists. However, the results soon fell into disrepute as other researchers tried and failed to duplicate them. Increasingly sensitive detectors, like the latest in a long line at presnt installed on Pluto, have to a large extent vindicated Weber's work and given him an important place in the pioneering work on relativity theory.

*Figure 3 The location of the black hole in the constellation Sagitarius.*

examination in the average museum display for less than 2% of the time, while for objects in storage this figure falls to less than 0.35%. With this new retrieval technique the museum object only experiences the passing of time during very short periods of examination. Thus conservation techniques such as stable relative humidity, low light levels, secure mounting, and so on have little or no relevance to the longevity of the objects.

## 6 Problems

Two problems were encountered with this novel system, one of which is now solved and the other of which is under extensive examination. The first problem involved one artifact which failed to return for no easily accountable reason. In theory at least, the Bendinelli/Fantini principle predicts the retrieval of an object from anywhere in the Universe, unless for some reason of inaccurate placing the object was dropped into a position occupied by a star. However, the mathematical chances of this are so remote as to be discountable in the present case. Although no other life has yet been discovered in the Universe, it is mathematically more probable that the artifact was stolen. Even the most pessimistic reading of the Drake Equation * indicates more chance of outright theft by an alien or aliens unknown than the loss of the artifact in the interior of a star, even one as big as Antares or Mira Ceti. The artifact in question, a rare washing machine by Bendix, is sorely missed, although the alignment system has since been refined and rendered tamper-proof to preclude further losses of this kind.

The second problem concerns a certain mathematically predictable disjunction shock which matter should experience during displacement. So far no actual damage to museum objects has been reported, although the condition reporting procedures to date have been less than adequate. The artifacts have been exposed to groups of visiting school children and the novelty of displacement has caused above-average examination time, so the potential for damage does exist. A planned visit by museum board trustees will provide a much more rigorous test. As with the effects of humidity and light, the changes due to displacement may be slow and insidious and perhaps only detectable over a long period of time. It is to be hoped that we have not exchanged a devil we know for one that we know not!

## 7 Conclusion

Albert Einstein foresaw the consequences of $E=mc^2$ and during his own lifetime the practical release of nuclear energy became possible. Even were he still alive into this century, he could not possibly have foreseen the use to which his geometry of space and time would be put in the museum context. It is a triumphant example of the peaceful use of a potentially lethal tool and it is hoped that this positive example will inspire others in all disciplines to seek to use technology in the service of humankind - to seek a future for our past.

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* The search for extraterrestrial intelligence began in 1960 when Frank Drake began a radio listening watch on two likely stars, Tau Ceti and Epsilon Eridani. Repeated attempts with more sophisticated equipment and better funding were carried out in the following decades with no success. A number of false alarms, like the synchrotron echo effect of 1993, stimulated brief interest and fresh budgeting, but nothing came of the search in the end. It is to be hoped that the theft of this washing machine, if such it was, will again stimulate the search for extraterrestrial intelligences and perhaps, who knows, aid in recovering the stolen property.

## 8 Acknowledgements

The successful completion of this project would not have been possible without the support of Drs. Neil Board and Max Plank of the Matter Displacement Facility. Thanks are also due to the curatorial staff of the Unnational Museum of Past History, where these tests were conducted, and in particular to Dr. Arno Streebgreeb who so regularly absented himself when any decision had to be made. Finally, the author is indebted to the King's Own Mounted Trumpets and Kettledrums for their spirited rendering of Vodzis, Seifot and Müller zum Hagen's *On the Occurrence of Naked Singularities in General Relativity*, Hamburg, 1972.

## 9 References

1. Einstein, A., "Special Relativity", 1905, "General Relativity", 1915.
2. Altenburg, J.E. and Vejvanofsky, P.J., "Versuch einer Anleitung zur heroisch-musikalischen Trompeter- und Pauker Kunst", in *Old Scientist*, 137 (2043) 37-43.
3. Bendinelli, C., and Fantini, G., "The Planck Constant, and Why It Isn't", in *Scientific Italian*, 53 (2071) 67-74.
4. Board, N., *Monteverdi; Our Ladder to the Stars*, Platypus Books, London, 2082.
5. Thomson, G., *The Museum Environment*, Butterworth's, London 1978.
6. De Peat, F., "Black Holes and Temporal Ordering", *Nature*, 239,387 (1972).
7. Heisenberg, W., "What Do We Keep All This Stuff For Anyway?", in *Journal of the Interplanetary Council of Museums* 2 (2067) 12-21.

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Auszug - Die Wirkung von zwei Anwendungen der Einstein Formel auf die Museums Theorie und Praxis ist erörtet. Erstere beschreibt die Fortschritte beschleunigten Alterns von Proben, wahrend die zweite den Nutzwert des Transportierens von Objekten in den Bereich der Schwarz flecke in Hinblick auf deren höhere Lebenswartung untersucht.

Résumé - Les effets des deux versions de l'équation Einstein sur les théories et pratiques de musée sont présentés. En premier lieu, on décrit les nouveautés dans le domaine du vieillissment accéléré d'echantillons. Deuxièmement, on discute des bienfaits en terme de leur durée de vie de transporter les objets façonnés près de trous noirs.

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Editor's Note - Due to the possibility of contention the comments of the referees together with replies from the author's advocate are printed in full. It is unfortunate that one has to deal with the author at second-hand, but due to the warped nature of the text this is inevitable. Because this paper encompasses both the science and the practice of conservation the two referees have been chosen with this in mind. The referees must, of course, maintain anonymity and for this reason the names of Margaret Thatcher and Ronald Reagan do not appear with the text.

## 1st Referee

The major weakness of this paper, and indeed of any over-view paper written by a non-specialist, is that it fails to go into the details necessary for a full and comprehensive analysis. This tantalizing lack of detail leaves the reader completely unsatisfied and, lacking the necessary mathematical proofs for the various assertions in the text, the paper falls flat on its face. For example, the inclusion of a page of calculations near the beginning is merely annoying and may well be an attempt by the author to show a scholarship which he so obviously lacks. It is specious and misleading.

One critical error must not go unmentioned in this review. The author seems to be confused with regard to the exact nature of the Schwarzchild radius, although it is obvious from even a cursory examination of the geometry. It is, in fact, quite impossible for a three-dimensional object to occupy a position exactly upon an event horizon when that event horizon is so obviously two-dimensional! The object would literally be required to have no thickness at all in order to exist in stasis on the event horizon, and this is manifestly impossible. This fact throws the content of the entire paper into question.

Incidentally, it is unlikely that Vodzis, Seifot and Müller zum Hagen's *On the Occurence of Naked Singularities in General Relativity* would have originally been played on trumpets. The paper is in the key of F which would be more appropriate to horns in that pitch, and thus played an octave lower than written.

## Advocate

I must answer for the author as he will not be born until the year 2046. When the first reviewer criticises the lack of substance in this paper he fails to realise two points. Firstly, that this is, indeed, a review paper for non-specialists who would likely not understand the mathematics if provided in more detail. (I find it noteworthy that, even though the calculations given in the text are pure *garbage*, the reviewer has failed to appreciate this.) If he has doubts, the reviewer is urged to go to the original source material, which is fully referenced and footnoted in the text, for full details; and if these have not been written yet he is urged to be patient and wait until they have. The second point is that, for reasons which ought to be obvious, the author is justifiably reluctant to publish material which has yet to be formulated. This would be to com-

mit pre-plagiarism, an unscholarly practice which is frowned upon in any age.

The point concerning the two-dimensionality of an object positioned upon an event horizon is a good one, but the reviewer is again ignorant of one vital point and that is that the author reports the process of placement upon an event horizon to have been accomplished with no apparent harm to a three dimensional object. Are we to infer that the author is a liar? Would it not be far better to remember that the reviewer and the author are separated by one hundred years of progress in science and technology? What appears to be a critical error to us may not be so to those in the future. In this light, the reviewer's comment may be likened to a criticism of Watson and Crick's double helix by Charles Darwin, with the difference that Darwin was, at least, a biologist while the reviewer is quite obviously not an expert in balancing even his own cheque book.

Although some doubt exists over the correct scoring of Vodzis, Seifot and Müller zum Hagen's *On the Occurrence of Naked Singularities in General Relativity*, the author feels, quite rightly, that to perform a thesis on space/time geometry on F horns would be absurd.

## 2nd Referee

As a museum person I cannot comment on the mathematical and scientific sections of the text except to say that they open mind-boggling vistas. However, where museum displays are concerned there are obvious points for criticism. It is not at all true to say that "...conservation techniques such as stable relative humidity, low lighting levels, secure mounting, and so on, have little or no relevance to the longevity of the objects". The effects of all these factors are insidious it is true, and the stasis technique may slow their effects, but if we are to preserve cultural material for the enjoyment and education of generations to come, we must pay attention to the causes of deterioration at all times. Our vigilance must never relax. All else is a breach of integrity.

It is to be deplored that a whole Bendix washing machine should be lost during the trial stages of the project. It is painfully apparent that more experimentation was needed before valuable, and in this case unique, artifacts were subjected to this technique. Why was it not possible to use Maytags, GEC, Hotpoints, or even Hoover appliances instead of such rare items? Now the author's generation and those uncounted in the future will never experience the totality of a genuine Bendix washing machine. This is an appalling loss. I propose, and I am sure my colleagues would concur, that a large number of Bendix washing machines be purchased and preserved by museums in order to offset this future loss.

Incidentally, we played Vodzis, Seifot and Müller zum Hagen's *On the Occurrence of Naked Singularities in General Relativity* in my museum on oboes and bassoons. It sounded great although there was no intention of re-creating it as it would have originally been intended.

## Advocate

I agree that the author is less than careful with his phrasing when he says that the above mentioned techniques "...have little or no relevance..." Perhaps we should bear in mind that attitudes towards material possessions in museums may well have changed in the years between, and are indeed changing in our own time, especially if we are to regard to paper in reference 7 as a touchstone to that era. It is apparent that their attitudes to art works may be less conservative than ours, although museums *per se* seems to be held in higher regard - although that's no great achievement. Perhaps in view of these things even the loss of a Bendix can be condoned. After all, in all probability it was quite throughly documented, the written work being as valuable as the object itself.

With regard to authentic performances of papers on space/time geometry, if you're not going to bother to even try to create the original ambience you ought to just shut up. Have you ever heard Sir James Jeans' *The Stars in Their Courses* scored for flugelhorn, rommelpot, bumbass and hurdy gurdy? It's awful!