

与中文翻译: 学术界不诚实地推动狭义相对论

DISHONESTY IN ACADEMIA TO PROMOTE SPECIAL RELATIVITY

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ABSTRACT. A central feature of special relativity is the increase of mass with velocity - mass going to infinity when a body approaches the speed limit of light. This feature is of the utmost importance as special relativity has been accepted by modern physics to have clearly proven Newtonian mechanics to be wrong fundamentally; Newton's mechanics has mass to be an invariant property of matter. As it is expected that students would not easily accept a dismissal of Newton's monumental work, the *Principia*[2], the physics academia tries to have a way to convince students that indeed this central feature of mass increasing with velocity could even be verified through experiments done in the usual laboratory of a university. The fact of the matter is otherwise - that even the original experiments by Kaufmann (1901), Bucherer (1908) that attempted to show mass increasing with velocity are flawed as the author has shown[6]. The proposed simplified experiments are tantamount to fraud propagated on unsuspecting students who may not have the time to delve into the issues more thoroughly.

Special relativity was proposed by Einstein in his 1905 paper. There were experiments by Kaufmann (1901)[3] and Bucherer(1908) [4]that proved that mass varies with velocity consistent with special relativity; this means a dismissal of Newton's classical mechanics. These original experiments are rather difficult to replicate and so the undergraduates of today have been introduced to various simpler modern setups to demonstrate special relativity experimentally. This paper would just comment on one such proposed experimental demonstration. This specific example shows that the physics department involved are acting with blatant dishonesty - the experiment is a fraud propagated on unsuspecting undergraduates (more preoccupied with passing their exams and getting their degree) who may not have much time to reflect on what they have been told in their lectures and in the laboratory. We'll see why?

Key words and phrases. Einstein, relativity, special relativity, relativistic, mechanics, mass, energy, momentum, $e=mc^2$, emc^2 , Lorentz force law, Bucherer experiment .

1. THE FRAUDULENT EXPERIMENT

The relevant paper is [1]:

"Relativistic Electron Experiment for the Undergraduate Laboratory".
Robert E. Marvel and Michael F. Vineyard,
Department of Physics and Astronomy, Union College.
<https://arxiv.org/abs/1108.5977>

We will mention that the arXiv archive is usually taken to mean the papers have been written by responsible and qualified authors; only recommended articles are allowed to be uploaded. Furthermore, this paper is also quoted in the Wiki article : "Tests of relativistic energy and momentum". From the acknowledgment, we can see that the professors in the physics department have implicitly given their approval about the quality of the paper.

The Acknowledgments in the paper:

We thank Christopher C. Jones, Emeritus Professor of Physics at Union College, for bringing the idea for this experiment to our attention, ... It is also a pleasure to thank Professor Chad Orzel at Union College for reading a draft of this paper and providing comments.

The Abstract:

We have developed an undergraduate laboratory experiment to make independent measurements of the momentum and kinetic energy of relativistic electrons from a β -source. The momentum measurements are made with a magnetic spectrometer and a silicon surface-barrier detector is used to measure the kinetic energy. A plot of the kinetic energy as a function of momentum compared to the classical and relativistic predictions clearly shows the relativistic nature of the electrons. Accurate values for the rest mass of the electron and the speed of light are also extracted from the data.

The idea in the experiment is simple and straightforward. The experiment has a source of relativistic electrons (beta particles traveling at speeds close to that of light) from a radioactive source. The momentum and kinetic energy of the electrons are measured for varying speeds of electrons (by varying the electric and magnetic field strengths). The data is plotted for kinetic energy versus the momentum. Two smooth curves are also shown representing how the data points show vary depending on classical Newtonian mechanics and for special relativity. As the figure in the paper shows, the experimental data points fit clearly the curve for special relativity and clearly do not fit that of Newtonian mechanics. So a modern undergraduate

experiment has been able to confirm what the earlier original experiments of Kaufmann and Bucherer proved. Is it true?

If everything as described in the experiment are without flaw then, of course, it could be taken to be our modern proof of special relativity. But what is found in this experimental setup is not about overlooked flaws in the experimental setup, but blatant dishonesty:

Such a setup is nothing other than propagating fraud on unsuspecting undergraduate students.

The abstract says "independent measurements of the momentum and kinetic energy of relativistic electrons". As those familiar with physics would know, many physical variables in experiments have no direct means of measurement; they are measured indirectly. In general, this is true of the such a quantity as the momentum of relativistic electrons. The theory describes how the momentum is measured through a spectrometer and this part is rather usual as it is done indirectly from theory and from measuring the magnetic field with a Gauss meter.

2. THE BLATANT LIE

The blatant lie is in "...independent measurements of ...kinetic energy..". For some reason, measuring kinetic energy of relativistic electrons (near light speed) is extremely difficult; there is no known simple indirect measurement of a particle's kinetic energy. Even if we can measure directly the speed of the electrons, we still cannot use this velocity v to calculate the kinetic energy; it depends on which kinetic energy formula to use. For Newtonian mechanics: $KE = \frac{1}{2}mv^2$; for special relativity, it is : $KE = m_0c^2/\sqrt{1 - v^2/c^2} - m_0c^2$; where m_0 = rest mass of electron, c = light speed. Measuring the speed of the electrons do not give us the kinetic energy; it depends on which kinetic energy formula we believe to be the correct kinetic energy formula.

Our present day physics can only do "independent" measurements of kinetic energy through one, and only one, means - through calorimetry. The calorimetric method is to allow the electrons to be stopped in a solid where all kinetic energy is somehow converted to heat energy. From the rise in temperature, the kinetic energy of the impinging electrons could be found. This is the one and only "independent" way of measurement of kinetic energy. It is earlier mention that this method is extremely difficult. The evidence in the difficulty is that since the discovery of high speed electrons from the 1900, such a calorimetric measurement has been attempted only once; it is with the lone uncorroborated experiment of William Bertozzi(MIT)[5] in 1964; no other person since has used calorimetry to measure the kinetic energy of electrons nor protons. Even for the relativistic protons in the Large Hadron Colliders (LHC), calorimetry is never used

to measure the kinetic energy of particles; they are all computed theoretical values based on their adopted physics.

So in the proposed experiment, what is the method used to measure kinetic energy? It uses a sensor, a "silicon surface-barrier detector with a thicknesses of 3 mm and an active area of 25 mm ". It is a commercial detector :

"Model CB-030-025-3000 detector,
Ortec, Advanced Measurement Technology, Inc.
Oak Ridge, Tennessee 37831-0895."

An electronic sensor relies on some physical phenomenon to detect impinging electrons and to make use of some generated signals to estimate kinetic energy. It could be calibrated in any manner the manufacturer want it to be; to calibrate according to classical kinetic energy of $\frac{1}{2}mv^2$, to obey special relativity or to obey what is in between classical and relativistic kinetic energy by averaging between the two mechanics; i.e obeying no physics! We can take an analogy from our bathroom weighing scale. We can have it calibrated normally or have it calibrated in a x^2 scale; your child of 15kg would then be weighing 225kg; your weight of 67kg would become 4489kg! You have a choice of what scale you want to have your weighing scale calibrated. So also it is with a silicon surface-barrier detector; it gives whatever values it is calibrated to give.

We do not expect such blatant dishonesty from the physics department of an august institution.

学术界不诚实地推动狭义相对论。

ABSTRACT. 文章摘要: 狭义相对论的核心特征是质量随着速度的增加 - 当物体接近光速限制时, 质量达到无穷大。这个特征是非常重要的, 因为现代物理学已经接受了狭义相对论, 以明确证明牛顿力学从根本上是错误的;在牛顿力学中, 质量是不变量。由于预计学生们不会轻易接受对牛顿不朽作品的解雇, 物理学界试图让学生相信, 这种质量的核心特征确实是随速度增加而增加的, 甚至可以通过大学常规实验室的实验来验证。事情的另一方面 - 甚至 Kaufmann(1901年), Bucherer (1908年) 试图表现出质量随速度增加而进行的最初实验都是有缺陷的, 正如作者所表明的[6]。所提出的简化实验相当于对不知情的学生做出欺诈行为, 他们可能没有时间更彻底地钻研这些问题。

爱因斯坦在1905年的论文中提出了狭义相对论。

Kaufmann(1901) [3]和 Bucherer (1908) [4]进行的实验证明, 质量随着与狭义相对性的速度而变化;这意味着驳回了牛顿的经典力学。这些原始实验难以复制, 因此今天的本科生已经被引入到各种更简单的现代设置中, 以通过实验证明狭义相对论。本文只是对一个这样提出的实验示范进行评论。这个具体的例子表明, 涉及的物理部门

是公然的不诚实行事;这个实验是一个欺骗性的传播者,他们毫无戒心的本科生可能没有太多的时间反思他们在讲座和实验室里被告知的内容。我们会明白为什么?

1. 欺诈性实验

相关文章是 [1]:

"Relativistic Electron Experiment for the Undergraduate Laboratory".
Robert E. Marvel and Michael F. Vineyard,
Department of Physics and Astronomy, Union College.
<https://arxiv.org/abs/1108.5977>

我们会提到 arXiv 档案通常意味着论文是由负责任和合格的作者撰写的;只有推荐的文章才允许上传。此外,这篇论文在 Wiki 文章中也有引用:“相对论能量和动量的测试”。从确认中,我们可以看到,物理系的教授已经暗中批准了论文的质量。

致谢:

我们感谢联盟学院物理学 Christopher C. Jones, 提出了我们关注的这个实验的想法, .. 也高兴地感谢联合学院的 Chad Orzel 教授阅读本文的草稿并提出了意见。

概要:

我们开发了一个本科实验室实验,进行独立测量来自 β -源的相对论电子的动量和动能。势头使用磁谱仪进行测量,并使用硅表面阻挡检测器测量动能。作为动量函数的动能图经典和相对论的预测清楚地表明了电子的相对论性质。还提取了电子的静止质量和光速的精确值数据。

实验中的想法很简单直接。该实验具有来自放射源的相对论电子源以接近光的速度行进的 β -粒子。测量电子的动量和动能,以改变电子速度(通过改变电场和磁场强度)。绘制动能与动量的数据。还显示了两条光滑的曲线,表示数据点显示如何根据经典牛顿力学和狭义相对论而变化。如图所示,实验数据点明确地拟合了狭义相对论的曲线,显然不符合牛顿力学的曲线。因此,现代本科实验已经能够证实 Kaufmann 和 Bucherer 原来的实验结果。是真的吗?

如果实验中描述的一切都没有缺陷,那么当然,它可以被认为是我们现代的狭义相对论证明。但是在这个实验设置中发现的不是在实验设置中被忽略的缺陷,而是公然的不诚实:

这样的设置只不过是对无知的本科生传播欺诈。

摘要说“相对论电子的动量和动能的独立测量”。正如那些熟悉物理学的人所知道的,实验中的许多物理变量没有直接的测量方法;间接测量。一般来说,这样的数量就是相对论电子的动量。该理论描述了如何通过光谱仪测量动量,这部分是相当普遍的,因为它是从理论间接地和用高斯计测量磁场而完成的。

2. 张胆的谎言

公然的谎言是“...动能的独立测量”。由于某种原因，测量相对论电子的动能（近光速）是非常困难的；没有已知的简单的间接测量粒子的动能。即使我们可以直接测量电子的速度，我们仍然不能使用这个速度 v 来计算动能；这取决于使用哪种动能公式。牛顿力学： $KE = 1/2mv^2$ ；对于狭义相对论，它是： $KE = m_0c^2/\sqrt{1 - v^2/c^2} - m_0c^2$ 其中 $m_0 =$ 电子的静止质量， $c =$ 光速。测量电子速度不能给我们动能；这取决于我们认为是正确的动能公式的动力学能量公式。

我们现在的物理学只有唯一的一个“独立”测量动能的量热法。量热法是使电子停止在固体中，其中所有动能以某种方式转化为热能。从温度的升高，可以发现入射电子的动能。这是动能测量的唯一“独立”方式。以前提到这种方法是非常困难的。困难的证据是，从1900年发现高速电子以来，已经尝试了这种量热测量只有一次；是在1964年与 William Bertozzi[5]（麻省理工学院）的独立未经验证的实验；自从使用量热法测量电子和质子的动能以后，没有其他人。即使对于大强子对撞机（LHC）中的相对论质子，量热法也不用来测量粒子的动能；它们都是基于其采用的物理学计算的理论值。

所以在提出的实验中，用于测量动能的方法是什么？它使用传感器，“硅表面阻挡检测器，厚度为3毫米，有效面积为25毫米”。它是一种商业检测器：

来自 Ortec, Advanced Measurement Technology, Inc., Oak Model CB-030-025-3000

Oak Ridge, Tennessee 37831-0895. “

电子传感器依赖于一些物理现象来检测撞击电子并利用一些产生的信号来估计动能。它可以以制造商想要的任何方式进行校准；按照 $1/2mv^2$ 的经典动能进行校准，以遵守狭义相对性，或通过两个力学之间的平均来服从经典和相对论动能之间的动力学。（即不服从物理学！）我们可以从我们的浴室称重秤中进行比喻。我们可以使其正常校准或者以 x^2 标度校准；你的 15kg 的孩子然后将重 225kg；你的体重 67kg 将成为 4489kg！您可以选择要对秤进行校准的标度。所以也是用硅表面阻挡检测器；它给出了校准给出的任何值。

我们通常不认为威严的大学物理系会有这种不诚实的行为。

陈家钊拉希德，
新加坡。

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