

# Newtonian Gravitational deflection of light

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A simple calculation is given showing that Newtonian physics can give the same value of light bending as claimed for General relativity in 1919, hence the supposed physics revolution in that year was a mistake.

## Introduction

There are various calculations that one can do in the context of Newtonian physics to get light bending equation. Here will be presented a very simple calculation giving same value as that claimed observed in 1919. Ideally I should have spotted this far earlier, but it seems that Einstein, Eddington and other relativists made the same omission.

The first calculation will be based on constant light-speed (light-speed - herein to mean in vacuum), and the second calculation based on variable light-speed

## Newtonian equations of motion

Newton's equations of motion [1] are:

$$1) \quad v = u + at$$

$$2) \quad s = ut + (1/2)at^2$$

$$2) \quad v^2 = u^2 + 2as$$

with average velocity =  $(u+v)/2$

$$\therefore (u+v)/2 = s/t$$

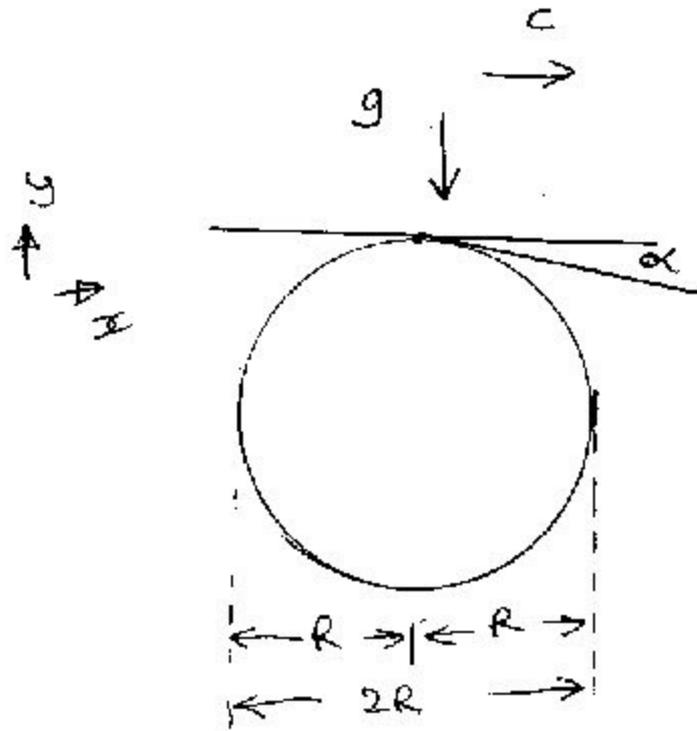
$$s = [(u+v)/2]t$$

$v$  = final speed,  $u$  = initial speed,  $t$  = time taken,  $a$  = acceleration,  $s$  = displacement

Calculation (1): for Constant light-speed

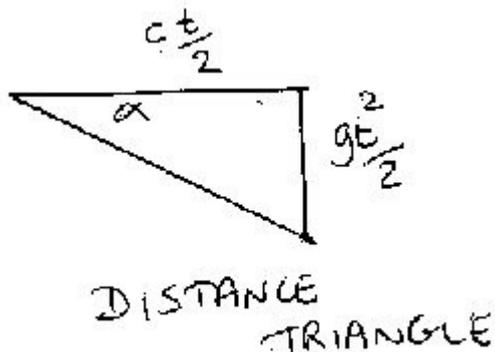
The relevant diagrams are as follows:

Diagram 1



This shows light with speed  $c$  passing by sun's gravity with its sphere of influence of radius  $R$ , it is acted on by a gravitational acceleration  $g$ . The light is bent through an angle  $\alpha$ .

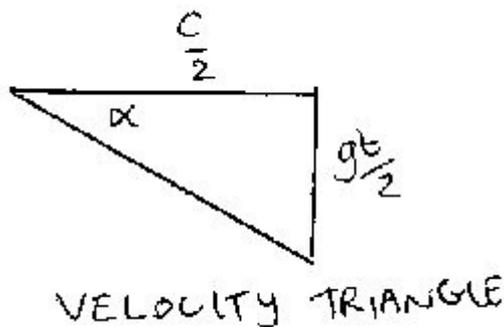
It then forms the distance triangle: diagram 2



Distance along x direction is  $2R$ , given light takes time  $t$  to travel distance  $2R$  we then have  $2R = ct$  giving us distance  $ct/2$  for the triangle formed from diagram 1. And in the y direction we have acceleration  $g$  which gives an average speed  $gt/2$  and if multiply by  $t$  again we get distance.

Average speed in y direction formed from equation: average velocity =  $(u+v)/2$ , where final speed  $v = gt$  and initial speed  $u = 0$ , so average speed =  $(0+gt)/2 = gt/2$ .

We can thus form the speed triangle (or velocity triangle if we take into account direction): diagram 3



Now what we want to find is  $\alpha$  and that would be given by  $\tan \alpha = gt/c/2$ . The angle  $\alpha$  is very small in the case of 1919 observation by Eddington and so  $\tan \alpha$  is approximately equal to  $\alpha$ . So we have:

$$\alpha \approx gt/c/2$$

$$gt/2 / c/2 = gt/c$$

Now by the Newtonian gravity equation have  $GMm/R^2 = mg$ , thus we have  $g = GM/R^2$ , and earlier had by  $2R = ct$  that  $t = 2R/c$ , so substitute these two equations and we have:

$$gt/c = (GM/R^2) (2R/c) (1/c) = 2 GM/(c^2 R)$$

The angle  $\alpha$ , claimed to be observed by Eddington in 1919 was twice this.

So, the Newtonian calculation at the time was claimed to be out by a factor of "2". However we can do another calculation-

### **Calculation (2): for variable light-speed**

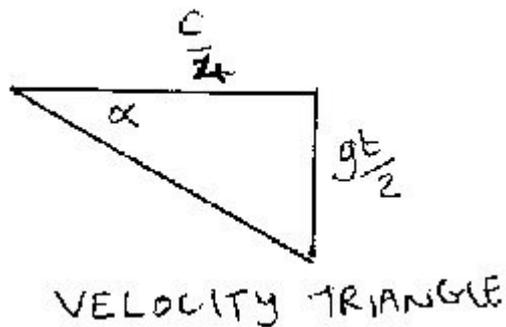
This calculation is similar to the first calculation, but now we do it for variable light-speed instead of constant light-speed and that means using the equation:

average velocity =  $(u+v)/2$  in the y direction.

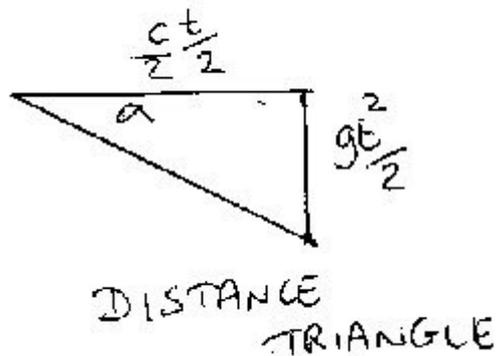
with  $v$  = final light-speed =  $c$ , and initial light-speed  $u = 0$  i.e. light accelerates from its source to speed  $c$  rather than is emitted at a constant speed  $c$ .

This gives us  $(0+c)/2 = c/2$

Speed (or velocity) triangle now looks like:



And distance triangle looks like:



Going back over the previous method of finding  $\alpha$  but now from these triangles, we have:  $\tan \alpha = \frac{gt/2}{c/2}$ , and for the angle  $\alpha$  very small,  $\tan \alpha$  is approximately equal to  $\alpha$ . So we have:

$$\alpha \approx \frac{gt}{2c}$$

$$gt/2/c/4 = 2gt/c$$

Now by the Newtonian gravity equation have  $GMm/R^2 = mg$ , thus we have

$g = GM/R^2$ , and earlier had by  $2R = ct$  that  $t = 2R/c$ , so substitute these two equations and we have:

$$2gt/c = 2 (GM/R^2) (2R/c) (1/c) = 4 GM/(c^2 R)$$

which is the same value for angle  $\alpha$ , as that which Eddington claimed to have observed in 1919.

How such a simple calculation could have been missed not only by myself, but by others as well needs some attempt at explanation -

### **Explanation**

1919 has been deemed such an important year in modern physics with publicity for revolution and Einstein being declared by many as the greatest genius ever, that most of us were fooled, myself included. So I was looking for a much more complicated calculation than the one above, and many others no doubt were similarly fooled by the complicated mathematics of General relativity based on its tensors. It is very easy to get fooled by the maths, and a simple slip of missing a "2" has occurred. Ideally it should have been seen long ago, but Einstein has been extremely unhelpful in explaining himself, he does not give references in his papers, and how he does things is very confusing. Within the context of Newtonian physics we have all clocks going at the same rate, but Einstein makes change that clocks go at different rates along with numerous other changes, and forms his Special relativity by steps that are unclear and then builds on this by adding the Equivalence principle to form General relativity. Add to that the admission by many people that Einstein was bad at maths, and others had to tidy up the maths; so what Einstein is doing is a mess. He supposedly arrives at the correct answer to what was observed in 1919 by this mess and that is then supposed to be acceptance of his theory (or theories) as making a mathematical prediction confirmed by experiment. And science is supposedly about confirming theory by experiment, so he supposedly met that criterion. But when we look at the mess he presented it is very difficult to see how he did it from that mess, thus we are forced upon supposedly following a complicated theory that needs its maths tidied up, where we are diverted to looking at complicated maths, and coming up with all sorts of complicated explanations for what is happening.

For instance in the context of Newtonian physics – if light is observed to bend then the prediction is from that theory that light has mass because in the Newtonian gravity equation – gravity operates through mass of objects that are attracting. But in Einstein's theorising – he decides that light has no mass so that it can travel at speed  $c$ , thus he comes up with explanation of gravity as space-time curvature. Einstein in other words makes numerous changes in narrative.

Newtonian physics talks of things in a certain way, while Einstein starts changing all of that and talking about things in a different way. All these things then influence us to look for something much more complicated than such as easy calculation above.

In other words – I am blaming Einstein – with the mess he made, he made everything very complicated, and it fooled him and it fooled me and its fooled a lot of people.

In previous articles I have explained that a bit of mathematical manipulation can turn Special relativity back into Newtonian physics (see for instance Introduction to Andertonian relativity), and in this article I show Einstein's General relativity has not changed that situation.

So now to the dealing with the maths:

### **Mathematical models**

The way to think of this – is if we have the principles of Newtonian physics as the theory of Newtonian physics then within that context we can form different maths models and try to connect that with observations in physical reality.

So in my previous calculation for light bending (see “Newtonian light bending”) - I had a mathematical model within the context of Newtonian physics. I ended up making too complicated a calculation to get the maths to fit to 1919 observation, because of the missing “2” I had to add extra to the maths to compensate.

When do the calculation better in context of better maths model (such as the one made above) then have a far simpler result comes out.

The temptation is then to say that the previous calculation in the previous maths model was a mistake. But it is a valid part of the mathematical modelling process – that if a maths model does not fit an observation (or experiment) then it can be updated – and that is what I did.

In this manner – it is impossible to prove Newtonian physics wrong – if we take Newtonian physics to be a set of valid principles – I.e. that have been shown valid, then we can then form numerous different maths models within the context of that, and so seek to fit any of these models to what is observed. Thus on that issue – those people who thought in 1919 that Newtonian physics was proven wrong were in error, because given a maths model out by factor of “2” by the method of maths modelling we then just introduce an updated maths model. The out by a factor of “2” proves nothing. But – many people were deceived that being out by a factor of “2” meant something in regards to physics revolution (by publicity), when it had nothing of the sort.

There was no change from Newtonian physics in 1919, and those who thought there was a change have had a profound misunderstanding about science, and by their erroneous belief have an a bad effect of retarding progress in understanding physics. They have hero worshipped Einstein, and so have sought to enforce the mess Einstein made as a perverse dogma rather than let it be tidied up.

Physics is long overdue a tidy up to sort out the mess that Einstein plunged us. That mess being highlighted by the continual supposed quest for a unified theory combining relativity and quantum theories, but a refusal by the mainstream engaged in that quest to undo the damage Einstein did.

### **Conclusion**

The Newtonian calculation at the time of 1919 was claimed to be out by a factor of “2”. But that claim from this calculation above is shown to be false. Newtonian physics can match that which was claimed to be observed.

The calculation itself is very simple. The explanation why I have missed such a simple calculation (up to now) and why others have missed it, is a much more complicated affair.

From the perspective of Newtonian Physics the prediction from the given observation of 1919 is – light-speed is variable and light has mass – but rather to adhere to the scientific method and work out what the observation meant in terms of the existing theory of Newtonian physics, the establishment went into a wild frenzy of speculation stirred on by a media circus surrounding portraying Einstein as a genius , and hence corrupting physics and the other sciences associated with relying on results from physics.

Einstein's method is not clear, but it seems to be roughly that he started from the assumption that the speed of light was constant. (The other assumption he stated was the principle of relativity, but that principle is consistent with Newtonian physics if the assumption of light-speed constancy is not added to it.) Starting with this assumption of light-speed constancy – Einstein then proceeded to make changes to the existing narrative of physics, introducing terms like relativistic mass, relativistic momentum etc. and other terms that had not previously existed in Newtonian physics. He then proceeded to try to deal with gravity, and based upon the description from Special relativity he (and/or his followers) decided that light must have no mass. This presented a problem with Newtonian gravity theory, because gravity operated through mass, so he had to come up with another description for gravity and came up with space-time curvature. So what we have from Einstein is a long line of changes made by him. And when light bending was encountered in 1919 it was still being interpreted by the initial assumption of light-speed constancy. Newtonian gravity theory was very flexible and could give two solutions – one for taking light-speed as constant (calculation (1)) and the other for light-speed being variable (calculation (2)). Thus the observation in 1919 in the context of Newtonian physics was indicating light-speed was not constant, and that was showing the initial assumption of Einstein in 1905 which he was building upon was false.

Thus any supposed change in physics; the supposed revolution; was based on this mistake by the factor of “2”.

### **Physics Revolution**

Most of us in physics have now been educated in Einstein's approach to physics to automatically work under his assumption that light-speed is constant, that we think it impossible that light-speed is anything other than constant, because of conditioning - to think that way.

However, there are dissidents that think light-speed is not constant. Various articles have been written on this issue, and I myself have written many in regards to the issue of the constancy of light-speed being misunderstood, and may having different meaning to what many have thought it means. An example of what is said-

Dr Robert Wagner in regards to his astronomical observations says [2] "To put it in simple terms, speed of light is not constant. It is dependent on the energy of the photon. And that's revolutionary because it's one of the fundamental laws of physics. Einstein predicted speed of light is a constant, no matter what you do, no matter where you are. Under no circumstances should there be a difference in the speed of light. The conclusion from our measurements is that this is not the case would mean quite a revolution of physics."

The speed of light is in fact variable on more than just this issue, and should have been concluded as variable in 1919 instead of taking up a supposed physics revolution based on initial assumption that light-speed is constant. To overcome that difficulty it now requires a counter-revolution to put light-speed back as being variable.

## **References**

[1] Newton's equations of Motion

[http://wiki.answers.com/Q/Derive\\_the\\_three\\_equations\\_of\\_motion](http://wiki.answers.com/Q/Derive_the_three_equations_of_motion)

[2] Gamma Ray Bursts, the Planck length, Dr Robert Wagner 26 Sep 2012

<http://www.mymultiplesclerosis.co.uk/universe-small/gamma-ray-burst.html>

Update of 10Feb2013 paper – to give more details and clarification.

c.RJAnderton24Feb2013