How exacly did Cavendish determine G with his torsion balance? How did the lead spheres show the value of G? Is it because all objects on Earth are in the same gravitational well as the Earth and they all will show the same value of G?

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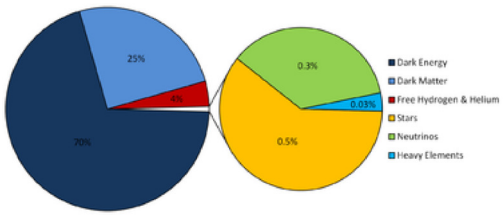
Cavendish did *not* determine G, and the lead sphere's did *not* show the value of G, in fact the set up Cavendish used cannot be linked to gravity at all, contrary to the urban legends obstinately spreading this notion.

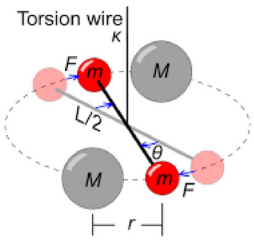
When we are confronted with measuring a Force per unit mass of 0.0000007N/kg, using wires, ropes and pulleys in the 1790ies, leading to a value of 0.000000000066 m^3/kgs^2 which in turn leads to the following pie chart, we should get our thinking caps off the hook and put them on for a while.



An allegedly scientific inquiry resulting in declaring 97% of the universe being beyond scientific inquiry is tantamount to the declaration of scientific bankruptcy.

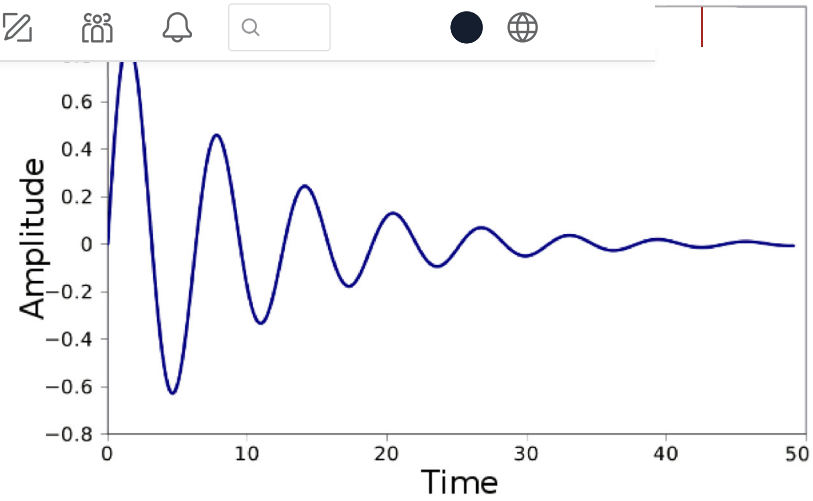
Because the Cavendish experiment is at the fulcrum of this disastrous development, we need to have a real close look at how it went down, what it tried to accomplish, and what considerations where deliberately or by ignorance left out of the equations in order to get what was aimed at.

The instrument used by Cavendish is a so called *torsion balance*, where a deflecting force is brought into balance (one should think) with the torsion resistance of a wire. The deflecting force [F] (gravitational attraction between two lead balls) is active on a load arm [L] resulting in a torque [F·L] which needs to balance out with the torque of the torsion resistance [κ] acting via deflection angle [θ]. $\boldsymbol{\kappa \cdot \theta = F \cdot L}$



"At equilibrium (when the balance has been stabilized at an angle θ), the total amount of torque must be zero, as these two sources of torque cancel out: κ·θ=FL"

Here we encounter the first big issue with this whole set up: *"Actually, the rod was never at rest; Cavendish had to measure the deflection angle of the rod while it was oscillating."* Imagine buying fish at the market and the vendor is naming you a price while his spring balance is still swinging! You would call him a cheat and walk away - yet we accept a number from Cavendish which he derived while his balance was swinging, i.e. *not* balanced ..... and it would never balance: which leads us to the next big issue - dampening: the twisting of a wire has to overcome friction, which is the prime dissipater of energy. Anything that is gravity driven has only the very limited amount of gravitational potential energy at its disposal to be dissipated, which would happen very soon. An oscillation that does not come to rest is not a gravity driven oscillation - and the experiment could and should therefore end right here in the dust bin.



In engineering school you learn something cosmologists obviously never do: to check your result against an educated guess and see if the result falls into the ballpark of what your experience and your "dead reckoning" tells you is plausible. If it doesn't you have to go back and check again. What is the Cavendish experiment trying to make us believe? What order of magnitude of force would two lead balls of a combined 158.75kg mass exert on each other? would that force be able to twist a steel wire? ad infinitum?

Imagine a thin steel wire, insert a thin steel rod through the strands and balance it out. Then let the **400th part** of a dune feather rest on one end of the rod. Does your intuition tell you that the rod would start swinging and not stop doing so, or does your intuition tell you that the rod would not budge under the "weight" of one little strand of this feather. I think it is clear where intuition tells us things would be going.

Such a feather has a hard time displacing the air and fall in a gravitational acceleration of 9.8m/s^2 yet we are to believe that the acceleration of 0.0000007m/s^2 can displace the same density of air with balls of a combined area of 40cm^2? Well, hardly, and that's why real precision torsion balances are housed in a vacuum - Cavendish's balance was not.

"Cavendish determined the attraction between the lead spheres at right angles to the direction of gravity. By doing so, ***he could eliminate from consideration the gravitation attraction of the Earth,*** *and deal solely with the attraction between the lead spheres."* says Bill Hazelton, and this shows how sloppy "apologetic" physics is - needs to be, in order to hold up nonsense results. The combined mass of the moving lead balls is 1.5kg, add to that the unaccounted for masses of rod and wire and multiply by 9.8. That gives you the stretching force on the suspension wire, and stretching forces change the resistance to twist, by increased friction. The consequence is, that this experiment would give different results on the moon, again different results in null gravity points, again different results in vacuum, and a combination of the above. So, there can be no question of a universal constant being the result of such an ill conceived experiment, which also leaves out of the equation all gravitational "noise", as if the four lead balls would be the only masses in the universe. They aren't and a basic tenant of gravity theory is that all masses affect all masses in the universe, with no shielding available. So the experiment is awash in gravitational noise, which is totally unaccounted for, and that includes the church down the road as well

This all is purely procedural and already we have a scientific freak show, now what about the math? Pure Copperfield, and we are sitting there ooh-ing and aah-ing and not looking closely because we have paid for the show and might as well be impressed. It is claimed that from the balance of $\boldsymbol{\kappa \cdot \theta = F \cdot L}$ (which we saw never balanced anyway) we can derive [G] via [F] by way of $F=G \cdot m \cdot M/r^2 \rightarrow G=F \cdot r^2/m \cdot M=\kappa \cdot \theta \cdot r^2/L \cdot m \cdot M$. Problem here is that we have two unknowns, [κ] and [F] and therefore the best we can hope for, the best this equation can give us is a relation: $\boldsymbol{\theta/L=F/\kappa=?/?}$. That means I get the same result for any [F] and any [κ] as long as their ratio equals θ/L. And here the Copperfield mathematicians get the inattentive, gullible public - which includes PhD holders and "applied" physicists - by saying "oh, but we have a measurement with the oscillation period [T], which gives us [κ] and then we have a value for [F]. Look! $T=2\pi \cdot \text{sqrt}(m \cdot L^2/2\kappa)$ and boom we are duped - because we are not attentive enough to stand up and say: wait, you cannot derive an absolute value from an equation with two unknowns, because [T] can also be defined as $T=2\pi \cdot \text{sqrt}(m \cdot L \cdot \theta/2F)$ and you are back at the ratio $\boldsymbol{\theta/L}$.

You cannot define the torsion coefficient of the wire by the force you want to measure. You have to know one of them independently. And because the whole setup was meant to find [F], Cavendish would have needed to present a painstaking independent research into torsion coefficients of wires and especially the very wire he used in the experiment - which didn't happen.

The next step is the interpretation of the experiment, which so far has been nothing but a scientific and mathematical ghost train anyway. For the interpretation, Cavendish (or rather his successors) reach back 2000 years and grab an arbitrary number derived form a similarly unscientific approach: Eratosthenes arbitrarily and without ever presenting results of an investigation into the nature of the sun rays hitting earth, postulated them to be parallel due to an assumed large distance to the sun - although he never observed parallel sun rays, as no-one ever has. This arbitrary choice resulted in a speculative diameter of earth which was plugged into the math of the Cavendish experiment and out came a number for earth's density:

$\rho=3g/4\pi \cdot R \cdot G=5.4g/cm^3$

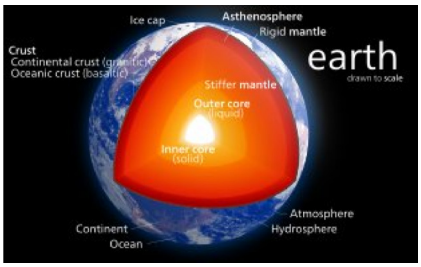
But we "observe" and measure the density of the earth to be $3g/cm^3$ and right there we get a discrepancy of 80% between calculation and observation. What is the solution? double checking the experiment? No, we invent an inaccessible and non verifiable "iron core" to supply the missing mass, and make the discrepancy go away - pretty much the same routine as later when computations based on [G] lead to 97% discrepancy which would be compensated for by inaccessible and unverifiable dark matter and energy.

Now, what does an iron core mean? how does it fit into a gravity theory? It does not, because the childish notion of the heavy iron "sinking" to the center of a sphere is NOT gravity theory, it is gravity fantasy. "Sinking" in gravity theory means being attracted, and attraction is *"force per unit mass"*. The center of a sphere has zero attraction, 0[g] = 0[F/m] and therefore nothing voluntarily "sinks" to the center of a sphere. There is also no pressure in the center of a sphere, because pressure is *"force per unit area"* and a column of earth 6371km high does not press down on the center, because it does not weigh anything at the center. Weight is mass times gravitational acceleration ($W=m \cdot g$) and gravitational acceleration at the center of a mass is zero.

If the Mass on top of that is rotating, the postulated solid - and therefore densest - inner core, floating in a liquid - and less dense - outer core would not stay centered but be flung around by centrifugal forces. For a mass, where the resultant acceleration vector points is where "down" is. The solid iron core would therefore "think" down is at the periphery and therefore "sink" towards the periphery, which is the crust, and not to the center, where no acceleration vector is pointed, because the center has no acceleration. Newton's "center of mass" is a mere mathematical artifact, not an attracting physical reality, and has no power to retain anything.

Next is the fact that a rotating mass with a liquid core wobbles and quickly comes to a standstill , in contrast to a solid mass which doesn't, and continues rotating much longer. Watch here under the title: *"Cool Science Experiment"*

So, this cool little science experiment alone tells us that the core of a rotating earth cannot be liquid, but then, it cannot be liquid for many other reasons too:



Imagine a peach with an interior speculated to be hotter that the surface of the sun but a skin so cool you can hold it in your hands. This skin would be undoubtedly called the worlds best insulator….. silicate rock - the material of the crust - is NOT the worlds best insulator, on the contrary, it is an excellent heat conductor, with thermal conductivity 100 times that of wall board and 4 times that of concrete. To expect we can walk barefoot on that skin of rock on top of billions of tons of red hot lava is pure nonsense. As is the notion that volcanos tap into that “sea of lava” which is speculated to be under a pressure of 1.4 million atmospheres.

Releasing the pressure of 1.4 million atmospheres of a “communicating vessel” would look differently, so obviously, every volcano taps into its own limited and local supply of lava under very different kinds of pressure, and is not connected to a fantasy liquid core of a spinning ball.

This is all the result of one utterly unscientific, crude “experiment” claiming to give a result with the preposterous precision of of e-11. This trend of nonsense has been updated with LIGO, where again an almost medieval, mechanical setup - mirrors suspended on wires - are supposed to give a result with the unfathomable precision of e-19. The flattest surface mankind can produce is to the diameter of a lead atom - which is pretty flat as grinding goes - but it is still a million times too coarse for the signal “obtained” from an experiment awash in the vibrational noise of a micro-seismic earth, where the amplitude of continuous shaking exceeds the signal by many orders of magnitude.

exploring and gaining knowledge about physical reality.

Charles Babbage (1792-1871) in his book *"Reflections on the Decline of Science in England"* describes in detail the methods used by a corrupt scientific body:

Trimming: the smoothing of irregularities to make the data look extremely accurate and precise.

Cooking: retaining only those results that fit the theory and discarding others.

Forging: inventing some or all of the research data that are reported, and even reporting experiments to obtain those data that were never performed.

The result of such selfish dishonesty is a near 100% ignorance about nature - which is an impressive number in itself, but certainly not satisfying and certainly not scientific.

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Pierre Castille · 5y
The author of this diatribe is being dishonest, claiming to know more than he does. It is a clever argument designed to fool the ignorant. Anyone who has studied physics will know just how wrong he is, but that isn't why he has written it. He (more)

3 Reply

Michael Brenner · 5y
Why not try a real physics argument instead of crying and lamenting? Obviously something here has disturbed your comfort zone, but the advantage of a physics discussion - as opposed to a philosophical or theological one - is, (more)

1 Reply

Roy Wilson · 4y
You're right — he starts off with false statements about the Cavendish torsion experiment, deceptively applying a statement about measuring the torsion strength of the wire to the measurement of the attraction between masse (more)

Reply

Frank Fiorentini · 5y
It has always been my contention that the experiment needs to be done with diamagnetic materials. Lead has a diamagnetic value of -1.8. Water which has a value of .91 can easily be deflected by a strong magnet. Neither electric or ma (more)

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About the Author

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