Trick or Truth: Mathematics' inappropriate domination of cosmology

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Abstract

This essay undertakes to explain the sometimes positive and negative connection between Physics and Mathematics. From antique Greece through the Middle Ages and the Renaissance to the 20th century a parabola is drawn, describing the often controversial relationship between the two disciplines. As crown witness for the harmful influence of math without empirical feedback, the development of Einstein cosmology is presented in some detail. It shows an 800 pound gorilla (mathematics) can easily suppress a small bird (physics) if nobody cares for a fair equilibrium. The mainstream Standard Cosmological Model, or Big Bang, with inflation and accelerating expansion is the result. It has no realistic physical background and based on a false redshift explanation. An alternative redshift mechanism is conjectured.

The antique origins

Math and Physics have a tradition of polarity. They belong together but often pull in the opposite directions. We know from our school days when wanting to understand Physics, more often than not bad explanations of the mathematical background hindered our understanding. This antagonism goes back thousands of years when the Pythagoreans 500 BC in Greece formed a secret math society. Pythagoras and Euclid were exemplary mathematicians whose inventions have everlasting truth. They never claimed anything as mathematical truth without showing corroborating physical evidence. School teaches the Pythagorean triangle and the Euclidian geometry and three-dimensional coordinate system invented 2000 years later. Comparing this with today's deplorable situation having to discuss whether space is Euclidian or curved, we can only wonder.

Ptolemy showed the worst example of Math cementing science with tricks. This genius developed the earth centered celestial mechanics using up to two dozen constants and parameters in confusing calculations. But these mathematical constants "fitted" the astronomical observations and restricted later scientists for more than 1000 years to develop the proper sun centered system. Later, the Church as protector of the "mainstream science" guarded this and other mistakes such as Aristoteles' Physics by penalty of death for heresy. The Silesian Kopernick wrote 15 books, but only on his deathbed he dared to sign the release for publication. He wanted to avoid Giordano Bruno's fate of burning at the stake. Math and Physics were strictly regulated. Math in the form of geometry was the mainstream 800 pound gorilla. Experiments were outlawed for which reason Galilei kept much of his innovative work secret. Finally, after the 30-years war some countries switched to Protestantism (cuius regio eius religio). A positive relation between math and physics developed.

An example of how Math helped science is the following story about Kepler: His friend from Stuttgart, a winegrower, asked him for help to calculate the content of a wine barrel. Kepler cut on paper the barrel in many slices (disks), calculated their volume R^2 x Pi x h and summed these up. Eureka! He had just invented Integration, which Math teachers often explain so badly.

A big help came from Bagdad to Europe in the Dark Ages, called "Algebra". Clerically controlled mainstream science forbade Algebra for a long time, preferring antique geometry. When Kepler deduced the law of gravity for the first time from his geometric laws he carefully used Latin words saying the "gravity force is proportional to the square of the distance between heavenly bodies". Even the progressive Newton preferred geometry in his writings. Finally, Algebra proved to be one of the most important tools of Science and Physics and the connection between math and physics became stronger in a positive sense.

The genius Leibnitz introduced the algebraic calculus, making possible differential equations. He dared to introduce the algebraic step, for example V = dx/dt or dx = Vdt. This opened a new area of mathematical physics in the 18th century for Newton, Laplace, d'Alambert, Euler, and many others. They demystified the connection between math and physics. In its wake this resulted in the greatest ever volume of scientific progress. Not only physics but all sciences and engineering profited from these math developments. Thermodynamics and electrodynamics developed so late in the 19th century because Clausius' or Maxwell's ideas were considered unthinkable without calculus and the related vector analysis. Math and experiments became interdependent.

One of the most diligent mathematicians of the 19th century was Euler. He developed thousands of mathematical solutions for physical and engineering problems and even found the bridge between geometry and algebra. This opened for Physics and Engineering a whole new world of understanding.

The examples show Mathematics can be a wonderful tool for Science. However, in the 19th century, too clever mathematicians introduced new methods like quaternions. The mathematical theorists introduced more and more difficult to handle tricks that were fun for them but a nuisance for physicists. They even boasted with their "tricks to prove truth". Physicists like Heaviside, who for example introduced the physically senseless 'displacement current' into electrodynamics for mathematical symmetry reasons only. He then called them "Maxwell equations" that poor Maxwell never saw himself. Generations of students again and again had to ask themselves 'why'?

The intelligent mathematicians like Gauss and Riemann introduced new methods that made much sense to them. Soon physicists started to feel their egos bruised if they did not fully understand or apply the new mathematical tools to their physics. Poincare and others created a real fad around the turn of the century by mixing their physical ideas with the latest Math. Math tricks became more important than physical truth.

Einstein was the cleverest in riding that wave. He took Minkovski's four-dimensional time-space symmetry, mixed it with Poincare's "Lorentz transformations" and relativity, added some self-invented new vector addition law and published this in 1905 as his special Relativity Theory. Being a physicist it did not bother him that no positive experiments were available as a foundation. He just admired the beauty of mathematical symmetry.

But this was not enough and nobody cared. As soon as Ricci and Levi-Civita invented their tensor analysis for useful calculations of plastic deformable bodies, Einstein jumped on this new mathematics. To this he added Riemannian geometry and Hilbert's system of differential field equations publishing this with a Herculean effort as his General Theory of Relativity. As a physicist, he based this on purely mathematical constructs neglecting all empirical work. This "Genie out of the bottle" coming from the Kaiser Wilhelm Institute in Berlin charmed the scientific community after 1916. Immediately, mathematicians and "theoretical physicists" like Schwarzschild, deSitter, Friedman, and others jumped on the wagon taking over the entire cosmology without any regard to physics. Whoever so wanted could invent a new "metric" to the EFE, camouflaging with this trick the fact of totally missing of underlying physical facts. Mathematicians make no experiments, so it is easy for them to invent new purely mathematical universes or cosmoses in their studies.

Parallel to this development, many real physicists in the 20s and 30s succumbed to Math as the only tool to understand the micro world. The mathematician Schrödinger deplored even having developed his equations, after he realized physics misused these to explain their weird "quantum jumps". Again, here too the primacy of Mathematics prevented physical understanding. Longo complained "You understand quantum mechanics if you have understood there is nothing to understand". Also, the great Feynman uttered "Nobody understands quantum mechanics". Is this the reason today that we fail to achieve any physical progress except in tiny incremental steps with experiments costing billions of dollars? Is the mini-incrementalism on us? The mainstream physics of Academia keeps insisting on the mathematical tricks and does not allow thinking physically "out of the box". The result is quantum mechanics and quantum dynamics with dozens of adjustable constants and parameters to make the experiments "fit". The question of truth does not count as a goal as long as the math fits. Does this remind us of Ptolemy and his mathematically splendid geocentric system? Will we need another thousand years to break out of this prison?

Coming back to Einstein Cosmology, and the Genie he let out of the Berlin bottle from his institute, then the world's center of physics: The Hilbert-Einstein system of 10 Differential Field Equations is mathematically non-refutable. However, millions of possible metrics are up for grabs for ambitious mathematicians inventing new universes. This unphysical trick without truth led to the unfortunate

Friedman-Lemaitre-Robertson-Walker cosmic model. Their metric made of the Einstein-Riemannian constant curvature R of the universe a function of time R(t). Einstein was shocked and fought this nonsense for decades calling it "abominable". It was too late. Not even he, the great Einstein, was able to put the mathematical "Genie" back into the bottle. Now, to his horror, the Genie appeared in the disguise of a "cosmological expansion".

Unfortunately, parallel in time, Slivers and later Hubble measured the so-called cosmological redshift of faraway galaxies. The tricky mathematicians jumped on this fact, obviously without caring for a physical cause. They just claimed this was observationally evidencing the expansion of space dictated by their metric. Nobody even cared how "expansion of empty space" is physically possible. Since their metric contained a singularity R(t0) = 0 ten billion years ago they postulated the "Big Bang", prophesizing a modern creationism. Since then millions of valuable mathematician's and theoretical physicists' work-hours are spent calculating what happened during these first 1E-45 seconds and then with inflation and even accelerated expansion.

The reader is asked to pause a moment, imaging: A galaxy at distance z=10, that means with a recession speed of 10c, whose light traveled 13 billion years to reach the Hubble space observatory, has receded in the meantime 130 billion light years further away! Isn't this a crazy idea? But a few physicists thought about different mechanisms to explain the cosmological redshift. When Gamow started the final run to success of the Big Bang cosmology in the 50s it had become the mainstream Standard Model of Cosmology. Whoever wrote something contrary, daring to discuss different cosmologies saw himself banned from Academia. Math tricks won over physical truth. The mysterious connection between math and physics went from positive to Faustian. Physics was firmly put under math tyranny, becoming mental and ethical slavery.

It is interesting that Edwin Hubble, probably the most famous astronomer of the 20s century who did most of measurements of the cosmological redshift, until his death doubted the recession velocity interpretation because physically unproven. Others interpreted the cosmological redshift falsely as "recession velocity" because the mathematicians just looked at the so-called Hubble diagrams. Hubble used to designate the redshift on the diagram's abscissa as a velocity in km/sec. Had Hubble applied the usual "z" or delta lambda/lambda, the relative wavelength increase, then he could perhaps have avoided this false interpretation. Thus by naming it a "recession velocity" relativist mathematicians took it as factual recession. Actually, it was meant only as a "spurious" recession velocity. Already in 1917, DeSitter called the expansion of the universe, resulting from his metric a "spurious expansion", explaining that it is not a real expansion of space.

Engineering and technology has fortunately escaped most tricks of mathematics. The Newtonian system of dynamic equations and forces were correctly applied up to modern developments like rockets and the APOLLO moon landing. Wherever mathematics in the past have failed to find closed form solutions for multi body differential equation numerical solutions, computers have helped in a fantastic way with numerical solutions. A truthful connection between math and physics is guaranteed so long as physicists and engineers use the fitting formulas and plug-in the right numbers. Caveat emptor! There was one important exception in the 1950is. Rocket scientists like von Braun and others tried hard to get approval from the US Government to launch a satellite around the earth using the V2-rocket with an upper stage. Enemies of that idea were mathematical astronomers like professor Schuette in Munich and others in USA. They convinced President Eisenhower's science adviser Milton Rosen to stop the rocket engineers. Their reason: The gravitational influence of the moon would not allow stable earth satellite orbits. False math in USA thus resulted in the USSR, launching the SPUTNIK.

The famous mathematician and astronomer Dingle was at the same time friend and enemy of Edington. After teaching relativity for forty years he finally came to grips with the physical nonsense behind it. Therefore, he wrote a seminal book on the refutation of relativity. Soon after he lost his academic reputation because in the Royal Society nobody wanted to "pee on Einstein's leg". Dingle warned society that a miscalculation based on a wrong theory could lead to the biggest catastrophe of humankind. This apocalyptic demonstration came to pass with the hydrogen test bomb "Bravo" in the Bikini Atoll. Here, Wigner, the most eminent mathematician of Los Alamos calculated that a few pounds more of a certain element wouldn't make much of a difference. The disastrous BRAVO explosion in the Bikini atoll was 10 times stronger than anticipated, causing many Marshallese deaths. It could however have been a hundred times stronger and destroyed a whole part of the earth.

Even worse would be a miscalculation of the relativist black hole believers. According to their calculations it cannot be excluded with certainty a high energy CERN experiment could go horribly wrong, gobble the earth and shrink it into a black hole the size of a golf ball. Such can be calculated from the general relativist filed equations choosing the right metric.

The wise Edward Teller said the horrible mathematical construct of General Relativity with curved space time was unbelievable and frightened him. Allegedly the most intelligent mathematician of our time, Witten in Princeton gloomily warned that upon us is the combination of General Relativity with String Theory, of all theories. Will the resulting monstrosity based on no single physical fact force Academia into a new round of fighting for nothing? It is one thing to dream about 1E500 multiverses but entirely another to prove it. Our modern brain is so used to sort our environment in mathematical terms and analogies we overlook sometimes reality. We can only hope the new James Webb space observatory will give us new evidence on

galaxies up to 20 billion light-years away. This is exciting and new theories of the universe, alternative cosmologies, will have a chance to evolve, mathematically and physically.

The solution of this problem of mathematical tricks dictating physics development without empirical evidence or rather impeding future physics developments is: Return to physics using mathematics as valuable tool to deepen and simplify understanding physics and extension of physical laws to areas we cannot reach. No more mathematical tricks that makes physicists and engineers feel inferior because they cannot understand it or find math mysterious. The reason they cannot understand these tricks is that they baulk at these as tricks only barring to help finding the truth.

So, what is the truth in this cosmological enigma? Creationism or a cosmos infinite in space and time? What is the in fact missing "dark matter" keeping the stars in galaxies at higher speed than Newton allows for matter? The question is answerable by solving the riddle of cosmological redshift. I have a hunch, or better said scientifically, I say: There is much more of the basic cosmic substance in space than we assumed. It is not dark but transparent. It is not an atomic element but a bipolar symmetric molecule. It is at low space temperature not ionized and can therefore neither be seen nor passive-spectroscopically measured. Who has a clue?

It is H2 in large quantities comparable in mass to the harboring galaxies and in the intergalactic space. This transparent H2 gas nevertheless has an index of refraction reducing the frequency of light over large distances by the amount of the Hubble constant thus causing the cosmological redshift.