Is there anything new about the research on heliophysics? Could something theoretically revolutionary happen to this field in the next 10 to 30 yrs?

This question previously had details. They are now in a comment.

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Here's what Heisenberg had to say about the ***future of research*** in general:

"*…that even major modifications of present physical theories would not transform them into the desired new theory, as quite different and* ***novel ideas are required.*** *Secondly, the impact of quantum theory and relativity theory on the minds of those scholars who helped found them during the first half of our century is conceivably such that* ***they are imprisoned*** *by these theories and thus cannot help but reason conformably, that is, in terms of traditional concepts;* ***whereas the need is for a whole revolution of thought,*** *which can only be carried through by* ***nonconformists****.... " (Mercier 1971)*

In the case of heliophysics, escaping the "prison of thought" ***Heisenberg*** is talking about, can only be achieved by stepping back and looking at the path which brought us to the position we occupy now with regard to the sun and her "physical" i.e. objective reality.

The ***Ptolemean*** model made no statements about objective reality, they treated us "down here on earth" as ***observers***, and naturally, the observer is the stationary vantage point around which everything moves in relation to - which is a very modern concept by the way, - ***Einstein, Schrödinger*** and ***Heisenberg,*** arguably the "fathers of 20th century physics", base their theories on this "relativity": to ***Einstein*** there is no objective motion, to ***Schrödinger*** no objective quality, and to ***Heisenberg*** no objective reality at all: *"In the Copenhagen interpretation of quantum mechanics, the* ***objective reality has evaporated****, and quantum mechanics does not represent particles, but rather, our knowledge,* ***our observations****, or our consciousness of particles."*

The moment you leave the terrain of observational reality, you have to have serious arguments ready to guide you into the unknown, into the unobserved. Did ***Copernicus*** have such arguments ready? He did not, his only argument being a computational one: *".….these hypotheses need not be true nor even probable. If they provide a* ***calculus consistent with the observations****, that alone is enough."*

So, the first step into heliophysics - putting her in the center against all evidence - was a purely computational one, unsupported by observation or experiment - which makes it helio-philosophy, not physics.

Then came ***Kepler,*** an ardent admirer of ***Pythagoras*** and his concepts about harmony in nature. His ***"Harmonices Mundi"*** is a love poem to the music of celestial bodies , *"… geometrical things which have provided the Creator with the model for decorating the whole world".* This is love, enthusiasm, theology and philosophy, but not physics. The physics test came when Kepler had the observational data collected by ***Tycho Brahe*** at his disposal - and to his great disappointment did not find God's harmony reflected in in them.

At that point the heliocentric train had gathered too much momentum already, the weight of personal agendas combined with that of prestige had to much of a lever arm to be unhinged by mere data, so Kepler simply fudged and cheated the world into believing his computation matched up with observation - when in fact it did not: his pivotal presentation of data to support the elliptical theory was ***"a fraud, a complete fabrication****…….It has nothing in common with the computations from which it was supposedly generated."* says ***Dr. Donahue,*** the translator of Kepler's ***"Astronomia Nova"***

From that moment on, heliophysics was doomed, and all "advancements" in that "field" where made by philosophers, or - as we will see - driven by other fields of investigations, which had their own problems with observational reality.

When ***Newton*** applied his ***"three laws of classical mechanics"*** to the movements of celestial bodies, he again bypasses observational reality, in the skies as well as here on earth.

This is an image I have taken of Jupiter and his moons with optics way more powerful than those ***Simon Mayr*** had at his disposal in ***1609*** (that Galileo discovered the moons is legend, similar to Pythagoras being credited with the theorem called after him) - and nothing observational would have suggested to Mayr that these are solid bodies, when they clearly appear to be lights.

Meanwhile here on earth, Galileo's ***"law of inertia"*** and Newton's ***3rd law*** demanded a *"force equal and opposite"* to an applied force, a resistance to change in motion, both in magnitude and direction. But, ***a body does not resist to be set into a falling motion***, so both Galileo and Newton do not apply. Measuring a 9.8m/s^2 acceleration of a body in free fall does not justify by itself to be associated with a mechanic force, if you cannot measure it.

Because of this, Newton had to overcome some serious explanatory problems when he tried to combine his ***"laws of motion"*** and with his ***"law of universal gravitation":*** the "where" and "how" of this invisible force:

1. First of all, Newton decided to just put up and live with the absurdity of the ***"how"*** for the sake of the greater good: "….*so that one body may act upon another at-a-distance, through a vacuum, without the mediation of anything else by and through which their action may be conveyed from one to another,* ***is to me so great an absurdity*** *that I believe no man, who has in philosophical matters a competent faculty of thinking, can ever fall into it.*
2. Because Newton's powers lay in wielding the sword of computation and not in rigging experimental set ups, he went for a mathematical artifact for the ***"where".*** One of the driving motivations behind developing a mathematical method called ***"calculus"***, was to show, that a spherical body can be treated mathematically as if all its mass is concentrated in the center - the ***shell theorem*** - which leaves only one point available as to the where a force could attack: the center.

Like with Copernicus, this is all computation, nothing of this is verified by experiment and observation, which means it is neither science nor physics.

Parallel to developing methods for describing mechanical systems, Newton together with ***Robert Boyle*** and ***Robert Hooke*** prepared the ground for another branch of physics: the physics of ***gases,*** which obviously plays a central role in heliophyics, as the sun is speculated to be a self compressed ball of gas.

The reason for Newton engaging in gas physics at all is, that it was totally beyond his wildest dreams that gases one day would be made responsible for creating a body so massive that it could direct the course of the entire solar system. He would have driven you out of his studio with wet rags would you have suggested something so outlandish to him: for a change, his math was based and derived directly from experimental results - not of his own - but of ***Robert Boyle***, who found that ***matter on a small scale does not obey gravity***, in that particles of a gas ***repel*** each other, indirectly proportional to the volume. p=1/V

The final set of gas laws reads as ***p=kNT/V***, where mass - and thus gravity - is not present, and therefore not active. Also, experimental evidence shows, that any fluctuation in the density of a gas is immediately equalized out through the entire volume, and does not intensify around this local asymmetry.

Enter ***Immanuel Kant,*** a philosopher of ethics, who obviously had not read Newton cover to cover, if at all. He goes on and postulates - against all available observation and experiment - a scenario where a cold cloud of gas aggregates around a local density fluctuation. 30 years before Kant's death, ***Jaques Charles*** showed with his ***"second gas law",*** that pressure in a gas is also directly proportional to the temperature of the system, adding another obstacle to gravity pulling a gas together: gravity being a temperature-blind inverse square law would have not only to fight against an inverse cube law (1/V) but also against a direct proportionality to increasing temp…. a thumpin factor of 15,000,000 in case of the sun.

So far, heliophysics has gone from being helio-computation to helio-harmony to helio-philosophy without even once touching actual physics.

The 19th century saw the industrial revolution as powered by the successful employment of the findings of real-world ***gas-physics*** as well as the disciplined acceptance of limitations established by the principles of ***thermodynamics***. Compressing a gas is the ***quintessential definition of work*** being done to a system. Work can only be done to a system if you have an independent, i.e. ***external energy source***, but gravity is no energy source, an energy converter at best, which leaves the question open where did the converted energy come from to begin with.

Even if we leave that fundamental issue aside for a moment, Newton's own math comes back and haunts "helio-physics" as it is practiced today. Nothing demonstrates better how such obstacles are "circumnavigated" in order to keep that heliocentric train moving than "Case Western University" online quick guide to pressure and temperature at the core of a gaseous sun:

Estimating Central Pressure and Temperature

Here, they start out with the concept of hydrostatic equilibrium: ***p=ρ·g·h.*** That means, they take the verifiable equation for pressure at, for instance the bottom of the oceans, ***p=p(1)+ρ·g·h*** and apply it to the sun, totally ignoring the fact that in the equation for the ocean, the term ***(ρ·h)*** designates ***M1*** whereas ***g*** designates ***M2*** in Newton's ***F=GM1M2/R^2***. The ocean only has pressure because a 6e+24 kg mass is under it. Would it not, there would be no pressure, because ***g*** would be zero. ***p=0+ρ·0·h=0***

So, here they go, and I kid you not: ***p=(GM⊙/R⊙^2)·ρ⊙·R⊙*** and from this they derive: ***p=GM⊙·ρ⊙/R⊙***

$$\frac{P_c}{R_\odot} \sim \frac{GM_\odot \bar{\rho}_\odot}{R_\odot^2}$$

$$\begin{aligned} P_c &\sim \frac{GM_\odot \bar{\rho}_\odot}{R_\odot} \\ &\sim \frac{(6.67\times10^{-11})(2\times10^{30})(1440)}{(7\times10^{8})} \\ &\sim \boxed{2.7\times10^{14} N/m^2} \\ &\sim 2.7 \text{ billion atmospheres} \end{aligned}$$

That is the same as saying the ocean water is itself producing the pressure - which it is of course NOT - it is the force of ***g♁ = F/m♆ = GM♁/R♁^2*** which is responsible for the pressure: the indexes ♆ (for ocean) and ♁(for earth) designate the two independent masses necessary in all situations involving gravity.

Now, this is only presented as being a rough estimate: *"To do it right we need to actually integrate the equation of hydrostatic equilibrium"* they say….. and off the cliff they go into nonsense Lala -land!

$$P_c = -\int_{R_\odot}^{0} \frac{GM(r)\rho(r)}{r^2} dr$$

There is so much wrong with this it's hard to know where to begin, but begin we need somewhere - why not with the numbers: what do you plug in for ***[R]?*** for ***[M]?*** for ***[ρ]?***

Gases do not form surfaces, but the equation needs a concrete number for ***[R]***, not a vague idea, so you have to make an arbitrary choice - based on what? Mass ***[M]*** and density ***[ρ]*** are also completely arbitrary and must have been different for every edition of the solar system, which we have seen a dozen or so since Copernicus - in terms of size, which is directly connected to mass and density of course.

They actually admit to this: ***"But we don't know M(r) and ρ(r) explicitly, so this is hard…."*** ha, yeah, well, I guess it is, if not to say impossible…..

but full of confidence they continue: *"But it can be done through models, and we get the better value of"*

$$P_c = 2.5 \times 10^{16} N/m^2$$

What "models"? which have *what* kind of input? every model reflects the state of knowledge or the intentions you have, and if you apply a nonsense algorithm you get nonsense out of it - which the following point illustrates:

The principle of ***mutuality,*** which is at the heart of Newtonian gravity: "*Two bodies can be drawn to each other by the contraction of rope between them. The cause of the action is twofold, namely the disposition of each of the two bodies; the action is likewise twofold, insofar as it is upon two bodies;* ***but insofar as it is between two bodies it is single and one …" (Newton)***

You can only integrate over change, but neither the product of masses ***[M1·M2]*** nor the sum of distances ***[R1+R2]*** changes on the way from surface to center of a sphere - which is what "they who pretend to do heliophysics" actually are assuming in the above example. ***[dr]*** from ***0→R⊙***

The product of two masses is thus *"single and one"*, and if one of the masses is zero, the product is zero. ***F=GM1M2/(R1+R2)^2*** …….integrating over one of the ***[R]***s only and only one of the Masses ***[M]*** is not honoring the principle of gravity and produces gibberish. In the center of any sphere, the pressure is of course zero, because there is no attraction possible: ***F/M1=G·0/(R1+0)^2=0*** ….. gravity is attraction, not something unilaterally pushing "down" on something else ….. The concept of the mass of the sun pushing "down" on a center which wants to expand "outwards" is a hilarious piece of nonsense, turning Newton inside out and upside down - but the train of preference is in motion and has to be kept in motion, so any research in helio-actual-physics has to wait until we come to our senses.

The 19th century has been very close to coming to their senses, because it was a century of scientist-engineers who had a very hands on approach and thus a very close contact to physical reality. Electromagnetism was the result of pure observation and experimentation by the "non-academic" ***Faraday***, and the ***study of radiation*** came right out of this hands-on approach. In the 1860ies these studies led scientists like ***Kirchhoff*** and ***Thomson*** to pick up on ideas as old as ***Galileo (1612), Descartes (1644), Lalande (1700***) and ***de la Hire (1774)*** all of whom treated the ***sun as being an incandescent liquid***. By the end of the 19th century a gaseous sun - at least for what was visible and accessible to observation - was practically dead, when ***Father Angelo Secchi*** - a renown astronomer and director of the observatory of the Roman College - offered a compromise: he advanced a solar model wherein the photosphere was formed of solid or liquid particulate matter floating on the gaseous body of the Sun. This again made no physical sense, but it allowed to stick to the ***Kant-Laplace nebula hypothesis***, while acknowledging observational data.

The big explanatory problem was the energy output of the sun, which was tied directly to demands by geologists, paleontologists and biologists for longer and longer periods of time. It was ***A. Eddington*** - a great admirer of Einstein - who picked up on E=mc^2, using the equation to explain the enormous energy output of stars over astronomical time periods. But he only moved the goal post into the foggy area where

thermodynamics and gravity had to be reconciled, and this reconciliation never happened. If the sun is putting out 3.846×10^26 watts, then which energy is going in? certainly not gravity, because you cannot have less of a principle!

Today we accept that space is replenish with ***plasma*** - Hannes Alfvén, Nobel Prize 1970 for his work on space plasma - and powerful ***magnetic structures***, so, Newton's vacuum just isn't there to allow solid bodies like planets orbit for billions of years unencumbered, we know that and we know that the sun cannot be a gas, yet we cling to that outdated idea like to a gospel - that is what Heisenberg meant when said we "*…are imprisoned by these theories and thus cannot help but reason conformably, that is, in terms of traditional concepts.."*

In resent years Cymatics have made a spectacular scientific entrance - or rather comeback - the study of longitudinal waves, like those of sound. We have successfully reproduced a ***"star in a jar"*** which is a minute star in a liquid, produced by longitudinal sound waves.

Tesla found the longitudinal EM wave and called it the ***"sound of light" -*** which is totally ignored by mainstream of course. But here is where the theoretical revolution is to be found - yet only by Heisenberg's ***"nonconformists".***

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Tony Emmerton · 5y
The VERY first time I witnessed sonoluminosity I said to myself "A star in a Jar"

Loving your work MB, theres a book in there.

Reply

Michael Brenner · 5y
Thanks for the thumbs up, Tony…. I'm actually considering something of the sort, but the topic is so vast, stretching across so many fields of inquiry that it'll take considerable more time to collect all the material. There are ve (more)

Reply

Tony Emmerton Im sure you are more than capable to tackle such a varied and multi…

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