Black Hole Gravity Explained

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ABSTRACT:

Gravity inside black hole event horizons is understandable only within the correct physics paradigm. Elements of the correct paradigm, with important linked footnotes, are found herein. This elegant 21st century model does not completely reinvent the wheel, but owes a lot to the standard model and to some elements of quantum mechanics theory.

There are two popular physics paradigms: General Relativity and Quantum Theory. Neither GR nor QT can explain gravity *inside* black hole event horizons, which means neither is a fully universal theory. Both cannot be reconciled into one physics theory for inside and outside BH event horizons. Few seriously question these two incomplete paradigms while we are being teased by data arriving from *outside* BH event horizons.

Therefore, envisioning a coherent and elegant third physics paradigm that explains gravity *both within and without* black holes is a very worthy task. Unifying physics for all parts and dimensions of our visible universe is the ultimate practical goal.

Sanjay Sood said it this way: "A quantum theory of gravity that is renormalizable to all orders but doesn't require extra

spatial dimensions or symmetries is one of the most important open problems in all of theoretical physics today."[1]

A black hole has been defined as a region of spacetime having gravitational force so strong that nothing we can directly detect appears to escape from it. The only way to indirectly examine regional black hole gravity, and to estimate the mass within, is to observe the behavior of visible matter outside the event horizon millions of light years after its real time data starts our way.

We are physically nowhere near any known black hole. If we were too close we could be sucked inside and torn to shreds. Experimentally, we are too distant to send probes there, as we can now do with our own sun. Solar-inspired probes could still operate outside event horizons, an environment very different from outside our sun's surface. However, any data successfully returned from near-event-horizon craft would arrive at a future Earth extremely different from Earth today.

Our sun is only eight light-speed *minutes* away. Our galaxy's modestly supermassive BH (with *four million solar masses* inside its event horizon) is about 26,000 light-speed *years* away from us, or 52,000 there and back. Other known supermassive black holes outside our galaxy are millions, even billions, of radial light years away from Earth. Stellar-mass black holes inside our MW (from collapsed large stars) also appear to be prohibitively distant, even for hypothetical light-speed travel.

Astrophysics in the 21st century is blessed with powerful and ingenious telescope networks costing billions of dollars that allow us to passively detect arriving photons from distant time and space. Astronomy is uncommon among the sciences, because our receiving and recording instruments work like time machines, thanks to the known finite speed of photons.

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[1] https://www.quora.com/Why-is-it-so-difficult-to-link-electromagnetism-and-gravity

In this early period of near-BH detection some data are already telling us more about reality than what we had first anticipated: For example, the size and shape of the first image of the great supermassive black hole event horizon in M87 (with 6.5 *billion* solar masses inside) revealed that *it has no inter-dimensional wormhole*, which spoils Hollywood's fantasies of time travel.[2]

This wormhole finding has not been generally disseminated, but it has great importance for several cosmological theories such as string theory.

How Data and Logic Question General Relativity

The history of emerging physics is full of fresh ideas being initially ignored, then rejected and challenged, by defenders of old paradigms. Anti-intellectual resistance reflects something darker than a superficial scientific method at work. It involves money, fragile egos, collegial pressures, and historically religion.[3]

Several cosmic models have nevertheless been modernized. The most dramatic example of old vs. new occurred in the 17th century when Galileo's telescopic views of Venus' phases, with resultant heliocentrism, could not be refuted by the Ptolemaic geocentrists who had "owned" celestial orthodoxy since 200 AD. Some defenders of anthropocentric geocentrism were ready to burn this heretical genius at the stake, but his personal friend the pope deflected them with a "confession" and house arrest.

Newton is the patron giant of 3D gravity theory. His alchemic formula for instant Gravitation was designed to be universal, although he had hardly a clue as to the real universe's size. During Newton's time any modern idea of black holes would have been totally weird – but I believe Newton would have enjoyed that idea within a vectorized 4D time model of the multiverse.

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[2] http://astronomy-links.net/BH.Image.Reveals.pdf

[3] http://astronomy-links.net/Religion.and.Math.pdf

Einstein's General Relativity apparently improved on Newton somewhat, changing space and time into 4D vector spacetime, based on the terminal speed of accelerated light in a vacuum. However, light speed in a vacuum is just that, not a mystical manifold for all points of reference. Einstein's theoretical weakness was ironically due to his Relativity not being sufficiently relativistic.[4] He confused real space with an element we use within space, accelerated photons. Multiversal space has all possible quantum points of reference, and x,y,z coordinates, transcending local and individual points of reference.

How Data and Logic Question Quantum Theory

Quantum mechanics (QM) and quantum field theories (QFT) owe something to Newton, and quantum ideas of space are locally more 3D than 4D. However, QM likes the idea of God rolling dice, Einstein claimed. Even though Einstein was a key founder of quantum theory with the particulate photoelectric effect,[5] Einstein was in spirit more classical. Progress needs to embrace but transcend both classical GR and quantum models, as partial value is found within both.

There is a way to move from discrete units (both linear and vector) to smooth classical curves. Consider how calculus was developed for nearly ideal curves (think Plato) emerging from the summation of ever smaller, toward infinitesimal, tangental lines.

In the Heisenberg model quanta seemingly move randomly, so observers can see either their motion or their position, but not both at the same time. The QM model is an artifact of relative, not Relative, perspectives. Observing the summation of more than single quantum "randomness," up to ever larger dimensions, yields an apparent classical smoothness. Quantum vector theorists can thus have their proverbial cake and eat it too.

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[4] http://astronomy-links.net/LightSpeed.pdf

[5] https://www.theatlantic.com/technology/archive/2014/09/einstein-didnt-win-a-nobel-for-relativity-he-won-it-for-this/380451/

Bootstrapping is a way to model how order ultimately shapes disorder among supposed fundamental particles. The key quantum particle or resonance is the photon; not the wrongly hypothesized string-theory, tractor-beam graviton. Photons within common quantum theory appear massless, but thereby would violate the keystone *F=ma* formula of Newton:

> Consider the case of the photon, the massless spin-1 particle of light and electromagnetism. For such a particle, the equation describing four-particle interactions — where two particles go in and two come out, perhaps after colliding and scattering — has no viable solutions. Thus, photons don't interact in this way. This is why light waves don't scatter off each other and we can see over macroscopic distances. Constraints on the photon's interactions lead to Maxwell's equations, the 154-year-old theory of electromagnetism.[6]

This bootstrapping game in some dimensions has been fun for the past century, and it's also backed up by plenty of quality data. Now *we need a better model for all dimensions, where reality may experimentally appear quantum toward small fundamental dimensions, but is actually classical, or even simultaneously yin/yang.* On this envisioning journey from the very small to the very large we also must not rush into poorly designed quantum experiments for very large scales.[7]

Hawking and Black Hole Environments

As previously noted, the dynamic environment inside a black hole event horizon is at best indirectly approached. Seeming blackness and extreme internal gravity and vector energy make it impossible for conventional force equations to make sense of

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[6] https://www.quantamagazine.org/how-simple-rules-bootstrap-the-laws-of-physics-20191209/

[7] http://astronomy-links.net/quasars.photons.pdf

anything therein. For that reason alone, black holes do not present an easy opportunity for unifying disparate physics models.[8]

Stephen Hawking's last foray into the unknowable was his idea of "fuzzy event horizons." He was trying to support the quantum thesis of high-level information conservation. His attempt at solving the black hole information paradox was a failure.[9]

Previously, Hawking hijacked an idea that he got in 1973 while professionally visiting the top Soviet nuclear scientist in Moscow. He then brazenly relabeled it as his own idea: Hawking radiation. There is some real value in the Russian quantum radiation idea; but not so for Hawking's recent fuzzy event horizon model. I go into more detail about his magical physics in this link:[10]

Where Singularities are Not Singularities

Roger Penrose and Stephen Hawking were first famous for hypothesizing that physical black holes have actual singularities. A singularity in physics is a place where all math dimensions except a point vanish, and where gravity itself terminates. The idea is elegant math, resulting from Penrose first reversing GR funnel formulas to their logical end. However, stopping just short of singularities confuses the clean GR physics model, and really challenges it. In subsequent years both backed off their early math model.

A more viable type of funnel is not the gravity-sheet vortex, but mundane meteorological tornado funnels. The bottoms of atmospheric funnels have accelerating rotational speed as their spinning diameters approach the ground. Air funnel bottoms never reach singularity diameters. Toward the bottom, whenever

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8 http://astronomy-links.net/SeeingUnseeable.html

9 http://astronomy-links.net/BH.Paradox.pdf

10 http://astronomy-links.net/Hawking.legacy.pdf

a tornado meets the ground there is a path of destruction, not a point. Some tornado paths can even be hundreds of meters wide. This analogous reality suggests that the funnel model of Penrose and Hawking can be modified to allow for physical "singularities" that are not just math singularities.

Quantum theory has a response to GR's original BH math. It involves a pushback from quanta in the highly compressed core of a BH that will never be a mathematical singularity. Even after there has been a constituent collapse to the step below a highly compressed neutron star (which is composed of neutrons, not compressed atoms as found in white dwarfs), there is never a total collapse of typical BH matter into a permanent point.

Whereas there are many black hole "singularities" in our visible universe, new universe-creating big bangs are exceedingly rare. This sharply skewed distribution strongly supports the stabilizing quantum pushback model, or more precisely its yin/yang variant.

A rare new big bang creating a new local universe following critically cascading inflows of mass would witness the total collapse of a real BH virtual "singularity" – overcoming primary electromagnetic push-back resistance, yielding *simultaneous and instantaneous* expansion into that new universe.

In Nichiren Buddhism the simultaneity of cause and effect is generally known as *renge [*pronounced *ren-gay].* During a BB unified yin/yang (matter/energy) instantaneously expresses as virtual pure yang energy – thereby allowing initial hyperluminal inflation of the expanding new universe, followed by restoration of the balance of matter and energy as yin/yang photons emerge.

Having dispensed with another Hawking math absurdity, let's consider what an actual core mass within a relatively permanent BH would be like:

The first question is just how large in diameter a typical BH core mass should be. An initial idea would be that it will be

somewhat larger than zero diameter, but increasingly more dense as infalling mass further compresses the pure center toward a non-zero minimum. For this initial idea to be realized, the strong model of quantum pushback would need to be challenged.

The increasingly-dense paradigm for non-BB cores does not modify the Schwarzschild[11] realities of BH gravity for different event horizons. From what we know, the positive-diameter model for BH cores most likely applies to all stable BHs, from stellar to extremely supermassive, which means that gravitational dynamics should apply equally within all spherical event horizons, adjusted by mass.

If BH cores remain small, but uniformly dense, no matter how much mass falls in, then such cores will proportionately expand in diameter to equally accommodate the new infalling mass. Also their event horizons will proportionately expand.

This simple fact points to *the essential nature of universal BH push/shadow gravity, which is the same as gravity elsewhere within our visible universe and the multiverse itself. We don't need to hunt for exotic new physics within each local universe, because there is one adjustable model for all the multiverse.*

Black Hole Gravity Items

Even while physicists puzzle over the nature of BH gravity, there are a few ideas that seem to work everywhere, such as:

- Centripetal and centrifugal forces, leading to furiously fast orbiting plasma on both sides of event horizons, but nothing faster than "c".
- The coexistence of inertial mass within rest energy.
- The coexistence of kinetic mass within kinetic energy.
- The absence of either pure mass or pure energy.

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[11] https://www.omnicalculator.com/physics/schwarzschild-radius

- Every central and core BH mass has its mass-proportionate Schwarzschild radius event horizon.
- Conservation of total gross energy and matter.
- The ongoing question of entropy vs. negentropy.
- Time is also an eternal present.
- Reality is objectively what it is, regardless of our theories, including those "proven" by religious texts and traditions.

Fundamental areas exist within BH theory where there is either no agreement, or some agreement based on the wrong physics:

- Does so-called Hawking radiation have enough cumulative quantum force to eventually evaporate all BHs?
- Will the universe eventually be sucked into BHs?
- Will everything that is ordered disappear into diffuse entropy, either within or without BH event horizons?
- Are some BHs and possibly other structures within our visible universe older than the current big bang components?
- How does Dark Matter function inside BHs?
- Is so-called dark energy relevant inside BH horizons?
- Are the physics inside and outside all event horizons the same – or are the laws of physics localized within separate local bubble universes such as ours, or even myriad within the magical math of 10^500 universes in M-theory?

To make sense of these and more disparate ideas about the weird wizard behind the BH veil, we now construct an elegant alternative. I will be your Toto, so to speak.

There are several elements essential for understanding what is going on within and without black holes. I have developed these topics below, and you are invited to peruse the several essays dealing with them within the "Clark's Web Pages" section of astronomy-links.net:

- Fundamental particles may appear to be quanta, but are not like how QM theorists imagine them.

- Double-slit experiments are just of visible photons, longer strings of yin/yang spheres, with lower energies and frequencies than Dark Matter photons. DM photons are not yet seen in slits.
- Our visible post-BB universe is one among a metaphorical bathtub full of interpenetrating local bubbles.
- This "bathtub" is actually the 3D multiverse, within which all vectors move along 4D lines, but not along gravitational branes.
- This truly universal "bathtub" has no definable size limits.
- The ultimate "edge shape" of the multiverse may appear to be like a virtual manifold directing back inward outward yin/yang quantum flows, minimizing the risk of diffuse multiversal entropy. The collective outgoing flows generate their own Coulombic[12] attractions, so the virtual manifold appears to reflect what is going on inside. No *deus ex machina* is required.
- Gravity everywhere is associated proximally with basic Coulombic EM forces, and generally with push/shadow vectors.
- In addition to dipolar electromagnetism, with unstable dipolar zero points, there is non-polar primary magnetism.
- The infamous universal "law of entropy" is balanced by the multiverse through the action of creative yin/yang flows.
- Strings are *not* two-dimensional math elements of a multidimensional universe featuring tractor-beam gravitons and 10^500 possible math universes, each with its own physics.
- The laws of physics likely are the same across and among local universes – which support both omnidirectional yin/yang flows, and the real inter-universal nature of "dark energy."
- Real strings are 3D "bead" structures of adhering 3D yin/yang spheres that stretch and snap back at "c" when leaving their hosting base (vibrating rings, or collective gravitons with no connection to weird tractor-beam gravity).
- When each EM bead-chain breaks free from its vibrating base it exhibits a frequency related to its wave length that determines what manifestation of photon it is, and what is its kinetic energy level.
- True Dark Matter has various forms of high-frequency strings and their combinations. We cannot yet directly see

[12] https://www.chemicool.com/definition/coulombic_attraction.html

them, but we know them as measurable gravitational and constructive forces.[13]

- "Dark energy" as commonly envisioned and measured misrepresents the push/shadow and yin/yang relationships among juxtaposed masses across separate local universes. Expansion that appears to be happening is real, but it is *not* because of a separate expansive "dark energy" forces.

Black Hole Gravity Dynamics

One of Isaac Newton's best friends was his friend only from 1689 to 1693. Nicolas Fatio mathematically envisioned "impactor gravity." Later, in the 18th century LeSage popularized Fatio's ideas. Toward the end of the 19th century Poincaré debunked the early Fatio model, pointing out that myriad hard impactors traveling at high speed from all spherical directions would quickly destroy Earth. Einstein was soon ready with his neatly envisioned geometric GR, and nobody thereafter seriously considered killer billiard-ball impactors. This understandable turn of events was the physics version of throwing out the baby with the bath water.

Fatio's gravity model was pure crazy genius, but his visionary astrophysics was mired in the 17th century, and he could not compete with the more agile Newton. We in the 21st century can look again to Fatio for general inspiration, as modified by the fully modern concept of multiversal push/shadowing. His highly wrong idea of tiny billiard-ball impactors must be abandoned in favor of the real pushing force: high-frequency, omnidirectional flows of multiversal yin/yang quanta, mostly as beaded-strings and rings.

I have written on this topic several times within my astronomy links site (as found in the "Clark's Web Pages" section), so what

[13] http://astronomy-links.net/M110.odd.galaxy.pdf

follows is a sketch of the model as it relates to actual BH gravity. Some of these push/shadow essays are as follows:[14,15,16,17]

It is important to note that the modern push/shadow model both correlates with – *and* is causally congruent with – real macro gravity.[18] To properly work, omnidirectional flows of yin/yang particles must primarily be multiversal to satisfy the need for *equal push* pressure from all spherical directions within, between, and among neighboring universes.[19] Sufficiently proximal and massive structures inside each universe (such as nearby planets) provide various degrees of partial *shadowing* for nearby objects, which completes the paradigm of real push/shadow gravity.

In contrast, 20th century geometric models employ weird ideas of inter-brane, tractor-beam gravitons and 2D strings. These odd models are very much in error, even while their seductive maths may correlate well – yet not causally describe real gravity at all.

It is thus one of the purposes of this essay to describe how the correct formulation describes actual universal gravity (including inside and outside event horizons), when other models fully fail.

Science already knows how solar neutrinos at 10^-24 m each are EM-neutral, and thus they can easily zip through baryonic masses such as the Earth itself. Our own bodies are penetrated by trillions of neutrinos each second, all without apparent effect. Similar penetration occurs when much smaller yin/yang particles in far larger numbers encounter masses, ranging from our fleshy

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14 http://astronomy-links.net/Quanta.and.General.Relativity.pdf

15 http://astronomy-links.net/SBH&MV.pdf

16 http://astronomy-links.net/Gravities,BlackHoles,BigBangs.pdf

17 http://astronomy-links.net/GGvsGR.html

18 http://astronomy-links.net/correlation.and.causation.pdf

19 http://astronomy-links.net/Universe.pdf

bodies; up to BH cores themselves, or at least their surfaces and outward within each event horizon.

By way of comparison, consider that yin/yang particles are individually in the realm of 10^-37 m; and neutrinos are in the realm of 10^-22 m, possibly 10^-24 m. That means neutrinos are 13 to 15 *logarithmic* dimensions larger – and yet they can easily penetrate entire rocky planets.

Atoms are at 10^-14 m, and adult humans are at 10^0 m. In brief, *the logarithmic size ratio between yin/yang particles and similarly mass-penetrating solar neutrinos is equivalent to the dimensional ratio between atoms and humans!*

Inside Black Holes and Outside

Astronomers can measure gravity behavior of orbiting visible mass outside event horizons. From that we can estimate the unseen internal mass. Interestingly, the general model works no matter what the internal masses are. Stellar-mass black hole event horizons at their borders with say 20+ solar masses are gravitationally the same way as supermassive black holes at their borders with 6.5 billion solar masses. This functional equality is from proportionate Schwarzschild radiuses.

Just because there are BH "event horizons" we can't penetrate with our instruments, this does not mean there is nothing much coming out of BHs beyond a weak stream of Hawking radiation.

Indeed, *BLACK HOLE EVENT HORIZONS WOULD SHINE BRIGHTLY IF WE WERE ABLE TO DETECT ALL PHOTONIC EM FREQUENCIES.* As mentioned before, the shorter the yin/yang string, the higher the frequency energy. We can detect gamma rays, but not yet directly access higher frequencies and energy levels. That's the Dark Matter realm.

Short-strand bead chains exiting event horizons everywhere above their spherical virtual surfaces keep net gravity near all black holes from becoming an eating monster. This partially shadowed exit flow is far greater than anything Hawking's radiation model would supply.

Pure Dark Matter is invisible to us, while baryonic dark matter such as dust cloud nurseries where stars and planets are born is visible with known frequencies. All variants of Dark Matter and dark matter have gravitational effects. We have been puzzled as to the nature of Dark Matter gravity when the correct theory clearly explains DM is just shorter EM strings and combinations with frequencies much higher than what our instruments can currently see. Reality doesn't care at all about our technological limits, or philosophical preferences.

Multiversal yin/yang flows interpenetrate EVERYTHING, even BH event horizons. That means they enter and exit. In a way similar to what larger neutrinos can do with baryonic masses, yin/yang particles can penetrate much more dense matter. We have learned that the central mass at the center of each typical BH is not a singularity, but a very compact mass that has not yet, and may never be, compacted to big-bang size. This non-point mass is therefore likely penetrable by neutral yin/yang particles flying at up to the speed of photonic light in a vacuum, or "c".

If we were to find ourselves out in deep space far away from any significant masses it would seem like we would be floating free. We would not be free floating in a vacuum, but encountering equipotent yin/yang flows from all directions, yielding a net push/shadow force of zero. This an improved version of the QT idea of just a static quantum sea. Here is a more elegant model than gravity funnels that overlap and compete with each other, while losing force at distance.

There is also a "quantum sea" of non-kinetic yin/yang particles with mostly potential, not kinetic, energy. You may envision this phenomenon as part of Dark Matter, usually imagined as invisible

gravity clouds. Some long strings of visible photons break up into shorter, higher-frequency, invisible strings. It is also possible that invisible sub-Planck dimensional structures combine and emerge within what are visible Dark Matter clouds.

Therefore, think of highly kinetic Dark Matter yin/yang units as like zippy fish randomly swimming inside the fairly stable Dark Matter quantum sea, all parts of which have their gravitational potential.

The bottom line here is that all sorts of incredible physics can go on inside BH event horizons, but neutral yin/yang particles may interpenetrate it all. A percentage of individual yin/yang particles will be forever incorporated into the awesome mass of the core, while most of the others exit with changed vectors.

To rephrase, most vectorized yin/yang particles entering the event horizon will be deflected or redirected by the core mass environment, and thus leave the BH by different vectors from the one where they entered.

Redirected particles are no longer able to push from their original direction. The ENTIRE volume within the event horizon thus functions as a virtual shadow when it comes to net pushing force. Even supermassive Schwarzschild radiuses are not that large on a cosmic scale, but they are still far larger than the tiny mass cores at their center – and they redirect a relatively large proportion of entering push gravity quanta per unit volume. In this way the entire event horizon's volume is able to intercept and deflect more of the incoming quantum flow, and thus have more net blocking "gravitational" effect on regions beyond its horizon.

When it comes to less massive bodies, such as stars and rocky planets, the same general physics applies, but in proportionately different ways. For example, most yin/yang particles penetrate an actual star easily and directly, or sometimes be incorporated therein. When such particles encounter rocky bodies, or squishy protoplasmic bodies like humans, they mostly zip right through,

even while there is occasional EM interaction. The inverse square law applies both in classical gravity and in electromagnetism.

Briefly in sum, the black hole central mass and its region where visible light cannot escape strongly intercept and disrupt all infalling and interpenetrating yin/yang quantum flows from all directions. An object sufficiently near but outside a BH event horizon itself will experience a NET attraction toward the BH event horizon – because the push flow coming out from the event-horizon will be LESS powerful than the unimpeded push elements coming from all other directions.

Plasma flows and more distant orbiting stars can for short or long periods thereby avoid entering an adjacent event horizon simply by enough orbital centrifugal momentum, which is a net balance between centrifugal and centripetal velocity forces.

Only when we inspect both the regions inside and outside of event horizons can we separate real universal gravity from deficient models.

Studying seemingly exotic BH gravity leads to understanding basic universal gravity, plus Dark Matter, and as-if dark energy. This new gravity model supersedes the old GR vs. QT divisions. All in all, that's a lot of progress in an area of physics that has made little progress over the last century.