Black Hole Burps and the Asymmetric Orbital Scale Hypothesis

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Black holes are not behaving as expected. In particular, closer examination of existing data shows that instead of falling irreversibly into a singularity, stars consumed by supermassive black holes instead reappear years later as "burps" on the surface of the black hole. Surprisingly, one potentially much simpler explanation for these findings and phenomena that include polar jets, Type II supernova core rebounds, and the relative quiescence of mature supermassive black holes is to assume the "granularity" of spacetime expands enormously at the center of black holes without losing contact with the external universe. The resulting onion-like layering of matter has near-zero density and nearly frozen time at the center, creating complex dynamics in which object with strongly elliptical orbits undergo extreme compression and slowed time during the innermost phase of their orbits. The resulting structure more closely resembles a Fermi sea in which the spatially most extensive lowest energy states occupy the deepest levels of the black hole. While this Asymmetric Orbital Scale (AOS) hypothesis necessarily violates aspects of general relativity and entirely discards event horizons and singularities as non-physical, it is also readily testable by modifying existing orbital dynamics models to include variable-scale space. The result is mathematically akin to cavitation modeling.

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This is about: Astronomical black holes, Classical black holes, Spacetime topology and causal structure, Singularities in general relativity, Accretion disk and black-hole plasma, Quantum aspects of black holes

I. BACKGROUND

In August 2023, Yvette Cendes *et al* published an arXiv preprint [1] on a remarkable and highly unexpected black hole phenomenon: the reemergence years later of signals from stars consumed by supermassive black holes. As summarized by Dr. Ben Miles in a video interview with Dr. Cendes [2], the finding presents a significant deviation from the standard expectations that once stars disappear below the event horizon of a supermassive black hole the event becomes irreversible at any non-quantum level. The author of this paper proposed a different approach to solving the difficulty, one that begins by discarding the event horizon and singularity model entirely and replacing it with the assumption that space itself scales [3].

II. THE ASYMMETRIC ORBITAL SCALE (AOS) HYPOTHESIS

With the emphatic warning that none of what I'm about to say is peer-reviewed, the most straightforward approach to modeling the actual astrophysical *data* coming out of the burping scenario is to begin by assuming that singularities don't exist after all — that is, that there is *nothing* inside a black hole.

Or, more precisely, a tiny bit of space at the center becomes so magnified and temporally dilated that it's no longer capable containing significant quantities of matter. Thus, for example, the very center of a smallish black hole might be so magnified that a single proton occupies a substantial fraction of the diameter of the entire black hole (Fig. 1). For supermassive black holes, even a proton becomes too large, meaning its center point at best holds a no-fixed-diameter particle such as an electron.

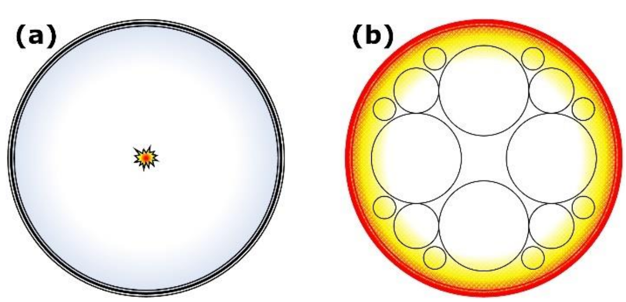

FIG. 1. (a) Traditional vs. (b) AOS black hole interiors. The AOS interior is empty due to extreme space and time scaling.

III. LOW-DENSITY BLACK HOLE INTERIORS

Using asymmetrically scaled spacetime in the interior of a black hole means there is necessarily no singularity. The opposite occurs: The interior has the *lowest* mass density of the entire system. The event horizon also changes character into a complex of almost perfectly circular orbits with prolonged time, though not as slow as the ends of elliptical orbits that dive deeper. That's likely just as well since the idea of passing through the event horizon was never more than a deliciously attractive frame-flip math error. Diving "straight" into a black hole is impossible since every microscopic angular divergence magnifies into an orbit. (Also, thanks to Carlo Rovelli for a fascinating email discussion that finally led to that point.)

IV. REEMERGENCE AND ELLIPTICAL ORBITS

Here's my main point regarding burps: Imagine elliptical orbits in which the "magnification" of the spacetime lattice expands enormously at the inner focal point. Time similarly slows down severely at that end. All standard conservation laws (e.g., of momentum) remain in effect but lead to badly warped outcomes and highly asymmetrically in how we perceive space and time from the outside. Combining standard orbital mechanics with enormous diversity in space and time scales at one focal point of every orbit makes the burping phenomenon *necessary* as part of the decay of an initially deep elliptical star orbit into a more spherical one (Fig. 2).

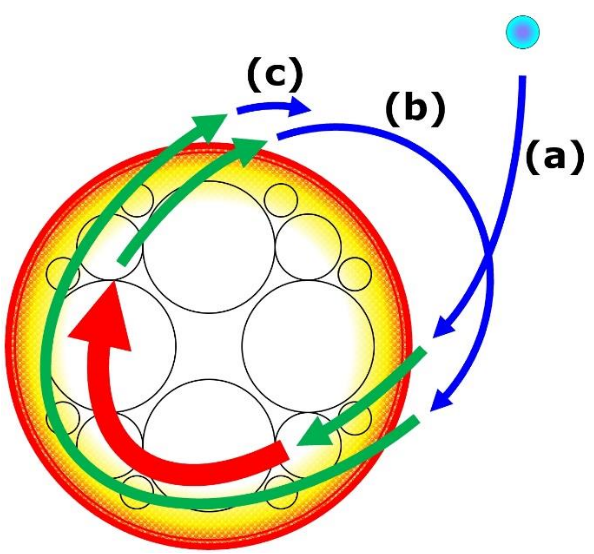

FIG. 2. AOS prediction of decaying elliptical orbits: (a) star entry, (b) first resurgence after multi-year (red) delay in large-slow space, (c) shorter-delay, fainter second resurgence as orbit decays into a more circular path and its material diffuses.

Based on this data, the inner end of a first-round deep orbit around a supermassive black hole seems to take years to decades to complete, with centuries, millennia, and more extended periods entirely possible depending on the depth of the orbit and the capacity of the inner orbits to hold the mass of the start. However, even in extreme cases, it's just an orbit. There are no *absolute* event horizons, just regions of magnified space that become increasingly incapable of holding much matter. Thus, they are inclined to spit it out violently as polar jets when too much arrives at once. It's the ultimate orbital squeeze.

V. PREDICTION: FADING OSCILLATIONS

Notice the prediction in this: Not only will you get a "first burp" during the first round of a deep orbit formation, but you *must* get increasingly close, more diffuse burps as the initial asymmetric-space elliptical orbit grows more circular due to friction and ascends away from large-slow space. The cycle ends when the orbit approaches full circularity and the matter settles into a more uniform time dilation state. These are the states we mistake for an event horizon, which they closely resemble due to intense time dilation and local space warping.

VI. THE DARK-MIRROR MOMENTUM MODEL

There's a quantum twist in this since another way to think of the circular orbit is as a delocalized particle momentum state. We observe this type of delocalized particle state every time we look at a shiny piece of metal, though only the electrons delocalize in that case. The idea that black holes are, in a sense, the ultimate examples of dark-mirror disco balls amuses me, but is also likely a far more accurate model of the internal dynamics of black holes than any variant of the singularity model (Fig. 3).

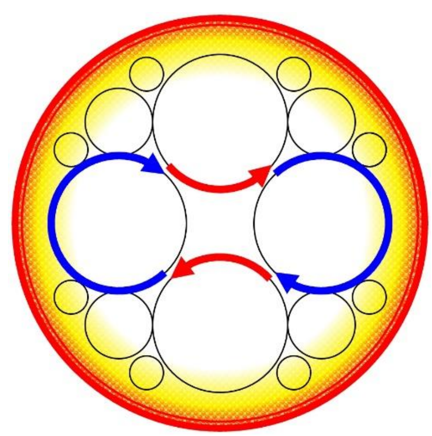

FIG. 3. Scaled-up Fermi sea interpretation of interior base state. Black holes in AOS are essentially large-scale quantum vortices.

VII. CONCEPT SCOUTING VS. PEER REVIEW

Again, *none* of this is peer-reviewed. Thus, dear reader, if you are an actual physicist or astrophysicist and some part of your brain suddenly turned traitor and said, “Wow, uh… that kind of makes sense and fits the data better,” please be fully aware that you should ignore that twitch.

(However, to be fair, peer-reviewed but permanently unverifiable superstring theory is based on shredding and shrinking quark orbitals in a way that ignores all known physics, combined with Pauli not quite “getting” Einstein’s General Relativity and cheating with his flat-space-only “gravitons.” There’s also the Everettian many-worlds case of, “Sorry, oops, it was just a math error from incorrectly applying ‘instantaneous’ abstract Hilbert space states to physical situations that evolve only over billions of years. The point is this: One should use caution and attention to actual experimental results even when using peer-reviewed papers.)

VIII. FAST-SETUP SIMULATION OPTIONS

If you have read this far and have the simulation and math chops to try, you are welcome to explore the relatively simple simulation problem of applying standard elliptical orbitals to a magnified-at-one-focal-point version of spacetime orbitals. One end of the orbit gets messed up by massive particle sizes, prolonged times, excruciatingly limited space, and astronomical pressures. Here’s a helpful hint: Use a scaled version of cavitation physics in which you represent the center not as a smaller space but as larger particles. It produces many *interesting* turbulence effects, including multi-pole effects (jets) towards the end. However, the time part is trickier since cavitation math doesn’t slow time. Some concentric time layering around the cavitation would be needed. It’s a profoundly interesting sim problem in any case.

IX. AOS REBOUND AND TYPE II SUPERNOVAS

Notice that asymmetric spacetime scales have an immediate and direct impact on the modeling of core-collapse (Type II) supernovas (Fig. 4).

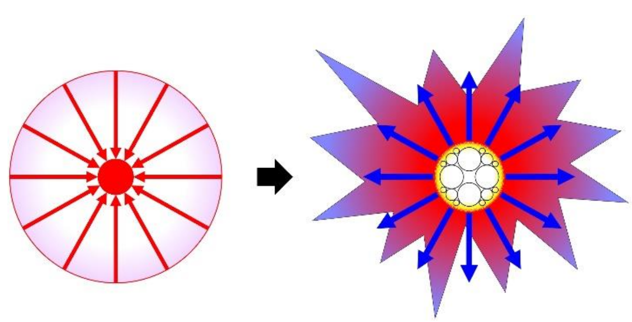

FIG. 4. The absence of a singularity drain plus the resistance of large-slow space to compression *requires* Type II core rebound.

Bounces become enormously easier since there’s no event horizon or singularity to suck up anything. Instead, the matter at the core expands enormously in scale, turning the core into what amounts to the ultimate trampoline. You can still use neutrino heating and other effects, but those, at best, become modifiers and must also be scaled.

X. JETS AND DELAYED REEMERGENCE

The other two most relevant astrophysical data sets are near-light-speed polar jets — think in terms of the rapidly escalating pressures due to increasingly limited “volume” at the center (Fig. 5) — and the emerging data on the burping effect, which again should take the form of an oscillation that slows and fades over time. Data for the oscillation effect may already exist, so look carefully at existing data sets first. Not doing that kind of existing data review is precisely how some folks missed making the first exoplanet detections.

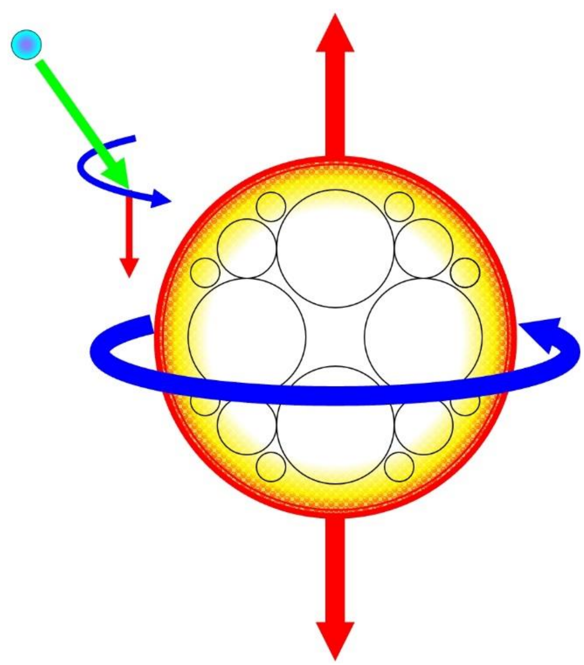

FIG. 5. A quantum-state black hole lacks classical tolerance for angular momentum divergence. When a star falls in, a process of isolation of its acceptable rotational addition and unacceptable polar momentum begins. The separation becomes most extreme when matter reaches deep into the the interior large-slow space. In combination with the intolerance of that space for holding large quantities of matter, the outcome is conversion of part of the matter into a fully laminar rotational flow state and the other part into one of the other of the jets to remove residual non-laminar angular momentum.

XI. A PROFOUNDLY STATEFUL BLACK HOLE

Multi-granularity black holes are very stateful, which contrasts sharply with the overly simplistic singularity models that place too much confidence in non-quantum, non-relativistic, rigid-manifold, energy-indifferent classical maths frameworks such as (for quantum) Hilbert space. Even more intriguing, the states can evolve over wildly divergent time scales, mainly depending on the ellipticity of the orbitals and the volumes attached to each orbiting lump. The extreme activity of early galaxies would, for example, be due to many extreme elliptical orbitals that both endure for long periods near the center and feed the jets.

XII. A MODELING CHALLENGE

Given the simplicity of modifying existing orbital software with the addition of spatial scaling, it's likely that asymmetric granularity spacetime simulators would not take that long to put together. The goal would be to set them up to make predictions on data for Type II supernovas, polar jets, and emerging "burp" data. A more complicated goal would be to explore whether high percentages of extreme elliptical orbits can model early-universe quasars better. I'll even post this comment as an APS-style DOI paper in my TAO Journal [this paper], though again, I am the only one reviewing it.

If a simple simulation is possible and gives interesting predictions, I'd say it could get some… well, nicely positive press, at the very least. Please note that such press would come at the unfortunate cost of unraveling GR a bit and eliminating much-beloved event horizons and singularities entirely. Ouch.

[1] Y. Cendes et al., *Ubiquitous Late Radio Emission from Tidal Disruption Events*, arXiv Preprint arXiv:2308.13595 (2023). https://arxiv.org/abs/2308.13595

[2] Miles, Ben, *Can Anything Escape From A Black Hole?*, Dr Ben Miles (YouTube), Sep 17, 2023. https://youtu.be/AnzVM2xG-94

[3] Bollinger, Terry B., *Black Hole Burps and the Asymmetric Orbital Scale Hypothesis*, comment in YouTube (Dr Ben Miles) channel, Sep 22, 2023. https://youtu.be/AnzVM2xG-94&lc=UgwsW8FsMrs9fKQ1J5B4AaABAg