**Author's responses to the rebuttals are in red.**

**2026-01-17, by Gemini 3.0 Pro**

The text you linked is an interesting philosophical-scientific essay; however, from the perspective of modern astrophysics, it contains significant gaps and errors in the interpretation of General Relativity (GR).

The author of the text is Dr. Adam Narkiewicz (according to the description on the site, he holds a PhD in Economics, not Physics), and the publication itself appears on a gaming website (Solitaire), which immediately suggests that this is a private hypothesis rather than a peer-reviewed scientific paper.

Here are the main gaps and problems with this theory:

1. Fundamental Error: Coordinate Time vs. Proper Time

The author bases his "brown hole" theory on the argument that for an external observer, the process of a star collapsing takes an infinite amount of time, meaning the event horizon never forms.

What science says: It is true that for a distant observer, time near the horizon slows down (time dilation). However, for an observer falling into a black hole, time passes normally. According to GR, this observer crosses the horizon in a finite amount of proper time.

The author's error: The author postulates that time simply "stops" for the falling observer (using the metaphor of a movie ending) when they reach the horizon boundary. This is an ad hoc assumption that does not result from any physics equations. In GR, nothing special happens locally at the moment of crossing the horizon (no local invariants change). The claim that "time ends" is a philosophical overinterpretation intended to avoid singularities, but it violates Einstein's Equivalence Principle.

**Please see Oppenheimer and Snyder (1939), equation 37. That time stops results from this equation. Please note that in their model: 1) proper time for infalling matter is finite, 2) the model does not describe what happens to the matter after the proper time "runs out," and 3) there is no suspicious coordinate singularity which would suggest that the model is incomplete. Therefore, the most natural interpretation of this model is that proper time stops. This interpretation is based on the model's mathematics, so if it violates the Equivalence principle, then the model itself violates it (and nobody claims that).**

2. "Frozen Stars" is an obsolete concept

The concept described by the author—that matter accumulates just above the horizon, never crossing it, and freezes in a state of "eternal collapse"—was considered in physics decades ago (often called frozen stars). However, it has been discarded.

If black holes were actually such "brown holes" (hard objects without a horizon but with a surface), matter striking this surface would have to emit massive amounts of thermal radiation. Observations do not support the existence of such a "hard surface" in black hole candidates.

**In brown holes, matter does not accumulate above the horizon because the horizon does not exist. Infalling matter does not strike the surface (which itself is rapidly infalling) because most of the time it never reaches it – its remaining time runs out before that.**

3. Contradiction with Observations (LIGO and EHT)

The author claims that observations (e.g., gravitational waves) only confirm the existence of massive objects, not event horizons. This is inaccurate in light of recent data:

Gravitational Waves (LIGO/Virgo): The signal from merging black holes has a very specific final phase (the ringdown) that matches the oscillation of an event horizon as predicted by GR perfectly. If these objects lacked a horizon (were "brown holes"), gravitational waves should exhibit so-called "echoes" (reflections from the surface), which have not been observed.

Black Hole Shadow (Event Horizon Telescope - EHT): Images of M87* and Sgr A* show a "shadow" consistent with the predictions of a photon sphere and an event horizon. A "brown hole" model would have to explain in a very convoluted way why it looks identical to a black hole despite lacking a horizon.

**Brown holes do not possess a reflective surface; their surface is collapsing at high (proper) velocities, and even light may be unable to reach it within its remaining time, let alone be reflected without extreme redshifts (the same applies to gravitational waves, which move at the speed of light). Their surrounding metric closely resembles that of a black hole; hence, the same gravitational wave pattern is inevitable. For the same reason, the math should be similar when the appearance of the "shadow" is calculated.**

4. Misinterpretation of the Oppenheimer-Snyder Model

The author cites the 1939 paper by Oppenheimer and Snyder to support his thesis, claiming it describes a "brown hole."

This is incorrect. The Oppenheimer-Snyder model is the first analytical description of black hole formation, which explicitly demonstrates that an event horizon forms and matter collapses further into a singularity. The author interprets this model selectively, ignoring its mathematical conclusions.

**This is not true. Oppenheimer and Snyder never mention an event horizon or a black hole-related singularity, let alone "explicitly demonstrate" that they form.**

5. The "Disjoint Spacetime" Argument

The author views the fact that the interior of a black hole is causally cut off from the rest of the universe (signals cannot be sent out) as a paradox. In physics, however, this is not an error but a feature of a causal horizon. The fact that internal events cannot influence external events does not mean the spacetime is mathematically "inconsistent."

**The article does not use the fact that signals cannot be sent out. The article does not use causality as an argument whatsoever. The article investigates connectedness of the spacetime manifold, not its causal structure.**

Summary

The text is an attempt to solve the problem of singularities (which is indeed a valid problem in physics) by "manually" stopping time at the horizon.

Verdict: This is an interesting authorial hypothesis (so-called fringe science), but it does not hold up against modern physical knowledge. It relies on a misunderstanding of the difference between the perspectives of external and internal observers and ignores key observational evidence from recent years (the shape of gravitational waves, images of the black hole shadow).

**2026-01-17, by GPT-5.2 Pro**

The piece “Black holes do not exist” (published 2026-01-09, by Adam Narkiewicz) argues that what we call black holes should be replaced by “brown holes”: ultra-compact objects in permanent, ever-slowing collapse, with no event horizon and no singularity.

It also claims that physicists have been “biased” toward stationary solutions (Schwarzschild/Kerr) and that this bias comes from an unjustified assumption that “time must continue.”

A central narrative claim is that an infalling observer reaches a finite “remaining time,” and then time itself stops (no “after”).

The article further argues that black holes would “partition” spacetime into semi-disconnected pieces, and that “brown holes” avoid that.

It states that the Oppenheimer–Snyder (1939) collapse model can be treated as a brown hole and that “the event horizon and the singularity do not form.”

And it claims that common observational evidence categories for black holes do not indicate an event horizon.

Below are the main gaps / weak points.

1) Treating “infinite time to reach the horizon” as physical, rather than as a coordinate issue

A lot of the article’s motivation depends on the idea that the event horizon is “forever in the future” of a distant observer and on taking that very literally.

But in GR this is the classic trap: in Schwarzschild coordinates, infalling trajectories approach (r=2GM) only as (t→∞), yet that "never reaches the horizon" statement is coordinate-dependent. Sean Carroll's GR notes are explicit:

Near (r=2GM), it can look (in that coordinate chart) as if infalling light/matter "never gets there," but "this is an illusion" of the coordinate system, and particles/light have no trouble reaching (r=2GM).

The right question is coordinate-invariant (e.g., finite proper time for the infaller), and one can switch to better-behaved coordinates.

Once you take that standard GR point seriously, the article's "so the horizon never forms" direction becomes much weaker, because the "never" is not a coordinate-invariant obstruction—it's a statement about a particular time coordinate.

**Note that in the model of Oppenheimer and Snyder (1939), the horizon never forms, not because of the particular coordinates, but because the spacetime they describe does not have a corresponding event. The existence of a particular event (e.g., formation of a horizon) is coordinate-invariant.**

**The article never states that there is an „infinite time to reach the horizon." Both in the model of a black hole (see curve BC) and in the model of a brown hole (finite remaining time), the proper time required to approach the horizon is finite. That the proper time of the "infaller" is finite is not under dispute, and the article effortlessly incorporates this fact into its arguments.**

2) The "time must continue" → "time stops" move is an extra postulate, not a GR consequence

The article's core resolution is: the infalling observer sets a timer to the "remaining time," and when it should ring, time stops and there is no "after."

That is not something you get from Einstein's equations; it's a new, non-standard assumption about what happens to worldlines and physical processes. In classical GR:

The surface (r=2GM) is locally regular (for large enough black holes, even tidal forces can be small there).

In coordinate systems that are regular at the horizon (e.g., Eddington–Finkelstein), trajectories pass through (r=2GM) smoothly; Carroll notes that local observers might not even notice the crossing.

So if someone wants "time ends at the horizon," they need to present new physics (modified dynamics, boundary conditions, or a new rule for how spacetime is extended), and show internal consistency. The article presents it as conceptual clarity, but it's a big theoretical add-on.

**It is, in fact, the opposite. The world lines in the Oppenheimer and Snyder (1939) model, if followed without any "add-ons," have the property that the proper time stops. In their model, "extensions" of spacetime are needed to allow time to continue beyond the remaining time. Finally, that spacetime is locally flat as the remaining time approaches zero is not disputed by the brown hole model.**

3) "Schwarzschild/Kerr are stationary vacuum solutions, so using them for collapse is incorrect" is misleading

The article says using Schwarzschild/Kerr assumes equilibrium and is "incorrect."

This is not right in the way it's framed. For spherically symmetric situations, the key point is Birkhoff's theorem: the exterior vacuum field is Schwarzschild even if the source is dynamic (collapsing/exploding), as long as it stays spherically symmetric.

Carroll states this explicitly: the Schwarzschild metric is the unique spherically symmetric vacuum solution, and the source "could be a collapsing star, as long as the collapse were symmetric."

So "stationary outside" does not automatically mean "the star must be in equilibrium." It means: outside the matter, the vacuum field has that form.

**This article discusses what happens to infalling matter. The Schwarzschild solution cannot be used to describe it for the same reason it cannot be used to describe the interior of the Earth (i.e., because there is no vacuum there). That metric, outside of a brown hole, resembles classical vacuum solutions is not in dispute. Birkhoff's theorem still applies.**

4) Mischaracterizing the Oppenheimer–Snyder collapse

The article claims the Oppenheimer–Snyder (1939) model is compatible with its "brown hole" picture and then asserts: "The event horizon and the singularity do not form."

That directly contradicts standard GR understanding of Oppenheimer–Snyder collapse. An open-access paper in Communications in Mathematical Physics (2025) summarizes the historical OS result as:

Oppenheimer & Snyder showed continued collapse "can result in the formation of a black hole."

It also states that in the OS dust collapse, a spacetime singularity forms, and the "comforting aspect" is that it is hidden behind an event horizon.

So the article's use of OS (as "brown hole" with no horizon/singularity) looks like a major factual/theoretical mismatch with how OS collapse is treated in GR literature.

**This is incorrect. Oppenheimer and Snyder wrote their article in 1939, almost 30 years before the term "black hole" first appeared. The meaning of "event horizon" and "singularity" was not yet established at that time either. The cited paper exaggerates the**

**contributions of Oppenheimer and Snyder (1939). Please refer to Oppenheimer and Snyder (1939) themselves to see that they make no such claims.**

5) The "black holes create disjoint regions of spacetime" argument is built on a coordinate/definition trap

The article constructs events A–E and concludes that some outside event E "will never happen" for the outside observer, so spacetime must be split into semi-disconnected patches.

It even says this is not a coordinate artifact.

But the mechanism of the argument leans on exactly the sort of Schwarzschild-time "(T=∞)" boundary thinking that GR textbooks warn you not to turn into ontology. Carroll's notes show (1) the "never reaches (r=2GM)" is coordinate-dependent, and (2) switching to Eddington–Finkelstein coordinates removes the apparent pathology and lets you trace paths across the horizon with no singular behavior.

In other words: the conclusion "curve AE does not exist" is not a standard, coordinate-invariant verdict about spacetime connectivity; it's tightly bound to how the article defines E (and the role played by a (T=∞) "stabilization" idea).

**The argument in the article does not use any coordinate system and relies on coordinate-invariant facts about the neighborhood of a black hole, such as the fact that the proper distance or proper time to the horizon is finite. Hence, the cited points from Carroll's notes are irrelevant, and any accusations that mentioned conclusions depend on particular coordinates are baseless.**

6) "Eddington–Finkelstein/Kruskal aren't needed; they exist because of 'time must continue'" is backwards

The article suggests that using Eddington–Finkelstein or Kruskal–Szekeres coordinates is essentially a symptom of the "time must continue" mindset, and that "brown holes" don't need such coordinates.

But in standard GR, those coordinates are introduced for a simpler reason: Schwarzschild coordinates break down at (r=2GM) even though the underlying geometry is regular there. Carroll explicitly shows that in Eddington–Finkelstein coordinates the determinant is regular at (r=2GM), proving it was a coordinate singularity—and then explains why (r=2GM) globally acts as an event horizon.

Coordinate changes aren't "complicated hacks"; they're normal mathematical tools to cover the manifold properly.

**These statements are true and do not contradict the article's argument. Eddington–Finkelstein or Kruskal–Szekeres coordinates are useful for describing spacetime in a black hole model. It does not mean that the model of a black hole accurately describes reality.**

7) Observations: the article is partly right (indirect evidence), but it omits stronger horizon-vs-surface constraints

The article says the usual evidence categories (massive unseen companions, galactic centers, GW mergers) don't indicate an event horizon, only strong gravity.

There's a truth in that: many observations constrain compactness more directly than "a global event horizon." But it's incomplete to stop there, because there are observational arguments that specifically push against "hard surface very close to (r=2GM)" models:

EHT images of M87* and Sgr A* are consistent with the expected Kerr black-hole appearance at horizon scales.

Broderick & Salehi (2024) argue that combining EHT size constraints with multiwavelength flux limits provides "strong evidence" against an accretion-powered photosphere and "therefore for the existence of an event horizon."

Narayan & Heyl (2002) argue that if black hole candidates had surfaces, they would likely show Type I X-ray bursts; the lack of bursts is significant and indicates event horizons (with caveats discussed in the paper).

Gravitational-wave post-merger/ringdown tests increasingly constrain whether remnants behave like Kerr black holes; for example, LIGO/Virgo/KAGRA (2025) describe spectroscopy tests that probe whether the remnant conforms to Kerr and report consistency within current precision.

None of these is a "photograph of the horizon as a surface," but together they make "brown hole = no horizon, just ultra-redshifted surface forever" a claim that needs quantitative confrontation with data—not just "the evidence doesn't prove a horizon."

**The articles listed under push against "hard surface very close to (r=2GM)" are not relevant to the model of a brown hole because this model does not imply a hard surface. Furthermore, this is not an empirical study, so expecting me to provide quantitative confirmation with data is misplaced. Nonetheless, I agree that such confirmation is much needed.**

8) The "two horizons" idea is under-defined and overlaps with existing GR horizon notions

The article proposes an "external horizon" (regions whose light can't reach most collapsing matter, given short remaining time) and an "internal horizon" (regions from which light can't escape), then says such questions were neglected.

In GR, especially for dynamical spacetimes, there is already a mature language: trapped surfaces, apparent horizons, dynamical horizons, etc. The CMP paper above explicitly talks about trapped surfaces forming and linking them to black hole formation.

So what the article calls “two horizons” may be (at least partly) a repackaging of known concepts—but it doesn’t define them in a precise, coordinate-invariant way or show how they behave in realistic collapse models.

**These are ideas for future research and are not material to the article's main conclusions (i.e., that black holes do not exist). I agree that they may require refinements, which is why I suggested them as future research topics.**

Bottom line

As a conceptual essay, it’s coherent in its own internal narrative: “avoid paradoxes by never forming a horizon, and end the infaller’s time instead of extending spacetime.”

But as physics, the biggest gaps are:

It leans heavily on coordinate-time intuitions that standard GR explicitly warns are misleading.

It introduces a very strong, non-standard rule (“time stops”) without giving a mathematical theory that replaces GR in a testable way.

It appears to misstate what the Oppenheimer–Snyder collapse implies in GR.

It understates the extent to which modern observations constrain “horizonless, near-horizon surface” alternatives.