

# The Eschatology of Light Cones: Cosmological Event Horizons, Existential Risk Mitigation, and the Metaphysics of Divine Judgment in 2 Peter 3:10

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## ABSTRACT

Modern physical cosmology, particularly the standard Lambda-Cold Dark Matter ( $\Lambda$ CDM) framework, describes a universe in which accelerated expansion can establish cosmological event horizons and progressively restrict causal communication between sufficiently distant gravitationally unbound regions. In long-term existential-risk analysis, this raises a provocative possibility: distributing civilisation across increasingly independent causal domains could reduce the probability that one localised catastrophe destroys every descendant population. This article examines whether such a physical strategy has any relevance to the eschatological claim of 2 Peter 3:10. Through interdisciplinary textual-critical exegesis, theological metaphysics, philosophy of causation, and a formal comparison of risk models, the study argues that cosmological isolation and eschatological judgment belong to different explanatory categories. Event horizons constrain causal influence within spacetime; they do not constitute metaphysical barriers against a theological claim about the Creator's judgment upon creation. The argument is qualified in two directions. First,  $\Lambda$ CDM is treated as a physical model rather than an unquestionable forecast of the universe's ultimate destiny. Second, divine action should not be described as a measurable faster-than-light signal, because doing so would incorrectly turn a theological doctrine of divine sovereignty into a physical mechanism. The central thesis is therefore not that God "travels faster than light," but that the explanatory scope of light cones is limited to physical causal relations within spacetime. The article compares three readings of 2 Peter 3:10—cosmic dissolution, transformative judgment, and localized/biospheric judgment—and shows that only the third creates a possible conceptual space in which spatial dispersion might matter. The theological conclusion is that eschatological security is not achieved through maximal cosmic distance but through the promise of "new heavens and a new earth" in which righteousness dwells (2 Pet. 3:13).

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## I. INTRODUCTION: THE TOPOLOGY OF COSMIC ISOLATION

Existential-risk scholarship asks a question that is both empirical and philosophical: what conditions would allow intelligent life to survive for extremely long periods without being eliminated by a single catastrophe? Nick Bostrom's account of existential risk and Toby Ord's later synthesis emphasise that risks capable of permanently destroying humanity, or drastically curtailing its future potential, differ from ordinary disasters because their consequences are global and potentially irreversible. One implication is that the architecture of civilisation matters. A civilisation concentrated in one planetary or stellar environment is exposed to correlated hazards; a civilisation distributed across multiple sufficiently independent environments may be less vulnerable to a single failure mode (Bostrom 2013; Ord 2020).

Physical cosmology introduces a striking complication. In a universe with sustained accelerated expansion, distant regions can become causally inaccessible to one another. The relevant concept is the cosmological event horizon: a boundary in the causal structure of spacetime beyond which signals emitted now cannot ever reach a specified observer, given the future expansion history of the universe. In a  $\Lambda$ -dominated Friedmann-Lemaître-Robertson-Walker cosmology, the future causal structure can therefore contain regions that become permanently disconnected for purposes of communication and influence (Friedman, Kaiser, and Gallicchio 2013).

This physical picture has been used to motivate a long-term resilience intuition: if intelligent life spreads into many causally separated regions, a disaster confined to one causal domain cannot automatically propagate to every other domain. The argument is compelling only under specified assumptions. It requires that the relevant hazards are physically mediated, that their causal

propagation is bounded by relativistic structure, and that the distributed populations are sufficiently independent. It also requires a probability model in which the risks of different domains do not remain perfectly correlated.

The theological question raised by 2 Peter 3:10 is fundamentally different. The passage does not present the end of the world merely as a very large physical disaster moving through pre-existing space. It announces "the day of the Lord," describes the passing away of the heavens, the dissolution of the elements, and the exposure of the earth and its works, and immediately connects these events to the expectation of "new heavens and a new earth" (2 Pet. 3:10–13). The text therefore concerns not only the fate of matter but the moral and teleological meaning of creation.

The thesis of this article is precise. Cosmological event horizons may be highly relevant to the mitigation of immanent physical risks, but they do not provide a theological defence against an eschatological judgment understood as the sovereign act of the Creator. This is a category distinction rather than an attempt to establish theology by physics. The article does not claim that cosmology proves divine judgment, nor that physics can falsify Christian eschatology. Instead, it asks whether a physical concept—causal isolation—can logically function as a metaphysical refuge from a theological claim. The answer is negative unless 2 Peter 3:10 is first restricted to a localised physical judgment.

## II. METHODOLOGY AND INTERDISCIPLINARY BOUNDARIES

This study employs a conceptual interdisciplinary method rather than an empirical experiment. The exegetical component uses lexical, literary, and textual-critical analysis of 2 Peter 3:10–13, with attention to the immediate argument of chapter 3 and its allusions to creation and the flood. The cosmological component treats  $\Lambda$ CDM as

a baseline physical model for discussing accelerated expansion, causal horizons, and the future accessibility of distant structures. The philosophical component distinguishes physical causation, probabilistic risk, and theological dependence. These domains are placed into dialogue but are not collapsed into one another.

Three methodological cautions are essential. First, a cosmological event horizon is not a wall in space. It is a feature of the causal structure of spacetime determined by the metric and its future evolution. Thus, expressions such as “regions behind the horizon” should not be interpreted as literal membranes. Second, the claim that civilisation-wide extinction probability tends to zero requires assumptions of independence that are not guaranteed. A common cosmic mechanism, correlated technological failure, or a shared vulnerability could make the risks across separated populations strongly dependent. Third, the phrase “divine non-locality” must be used carefully. Classical Christian theology affirms divine omnipresence and providence, but it does not entail that God is a physical signal propagating superluminally. The relevant claim is metaphysical: God is understood as Creator and sustainer of spacetime rather than as an object located at one coordinate inside spacetime.

The paper therefore uses a comparative causal vocabulary. “Horizontal causality” denotes ordinary physical relations among events in spacetime. “Vertical causality” is a metaphor for the ontological relation of creation to its Creator. The metaphor is not a proposal for a second physical force. It marks a difference in explanatory level. A light cone constrains what physical event can influence another physical event under relativistic dynamics. It does not, by itself, settle whether the universe is contingent, why there is a physical order at all, or what theological judgment would mean if God exists.

### III. TEXTUAL AND EXEGETICAL ANALYSIS OF 2 PETER 3:10

#### 1. The Day of the Lord and the Narrative Logic of 2 Peter 3

Second Peter 3:10 should not be isolated from verses 5–13. The author responds to scoffers who infer from the apparent stability of creation that the promised coming of Christ will not occur.

The response is explicitly cosmological: the heavens and earth existed by God’s word; the ancient world was judged through water; the present heavens and earth are reserved for fire; and the Lord’s apparent delay is interpreted not as failure but as patience. The sequence culminates in the “day of the Lord” and the expectation of a new creation. The rhetorical point is therefore not to satisfy curiosity about a physical mechanism but to overturn the inference that present stability guarantees future stability.

The expression “like a thief” emphasises unexpectedness rather than a physical mode of transmission. In the New Testament, the thief image is associated with suddenness and the failure of human prediction. The metaphor should therefore not be translated into a claim that the eschatological event violates relativity by sending a signal at infinite speed. The author’s theological point is that the day arrives according to divine timing, not according to the expectations of the scoffers.

#### 2. Stoicheia: Elements, Cosmic Structures, or Powers

The noun *stoicheia* is semantically flexible. In Greek usage, it can refer to elemental constituents, basic components, or foundational principles. In some early Christian contexts, it can also be associated with cosmic powers. In 2 Peter 3, however, the term occurs alongside “heavens” and “earth” and is linked to fire, dissolution, and the coming new creation. It is therefore reasonable to understand it as part of the cosmic order, although the precise referent should not be equated anachronistically with modern subatomic particles.

This qualification is important for interdisciplinary work. If *stoicheia* is simply translated as “subatomic particles,” the ancient text is made to predict modern particle physics, a conclusion that the linguistic evidence does not warrant. Conversely, if it is interpreted so broadly as to mean only abstract moral principles, the physical imagery of heavens, earth, fire, and dissolution is weakened. A more defensible approach recognises that the text uses ancient cosmological language to speak about the instability of the present created order under divine judgment (Bauckham 1983).

### 3. The Textual Variant: *Heurethesetai* and *Katakausetai*

The final clause of verse 10 presents a significant textual-critical problem. Critical Greek editions preserve a reading built around *heurethesetai*, “will be found” or “will be disclosed,” while the textual tradition also reflects the alternative reading *katakausetai*, “will be burned up.” The difference is theologically significant because “burned up” naturally suggests destruction, whereas “found/disclosed” can support a reading in which the earth and its works are exposed before divine judgment. The critical tradition also reflects uncertainty around a small negative particle in the clause, demonstrating that the textual history is more complex than a single universally fixed wording (Metzger 1994).

The variant should not be overstated. A textual preference for *heurethesetai* does not by itself prove that Peter teaches renovation rather than destruction. Nor does *katakausetai* by itself require absolute annihilation. Interpretation must be controlled by the entire paragraph. Verse 13 is particularly important: the future is described as “new heavens and a new earth” in which righteousness dwells. The language can accommodate continuity and discontinuity simultaneously. Something genuinely new is promised, yet the promise is framed in relation to creation rather than as a simple escape from creation.

The textual-critical observation strengthens the article’s central category distinction. Whether the verse is read primarily as destruction or disclosure, the event is not described as a hazard that travels from one galaxy to another through ordinary physical propagation. The judgment concerns the created order as a whole and is framed by divine promise, moral accountability, and new creation.

### 4. Fire as Physical Image and Theological Sign

Fire in biblical and Second Temple Jewish literature can signify destruction, purification, revelation, or judgment. In 2 Peter 3, the imagery is explicitly connected to divine judgment and ethical transformation. Verse 11 asks what kind of people believers ought to be if all these things are being dissolved, and verse 13 turns immediately to righteousness in the new creation. The ethical

conclusion demonstrates that the cosmological language functions as theological exhortation.

Consequently, the modern concept of heat death should not be simply identified with Peter’s fire. Heat death is a thermodynamic scenario concerning the long-term approach toward a state of diminished free-energy gradients under a particular cosmological model. Peter’s fire is a theological image embedded in an eschatological narrative of judgment and renewal. Similar language of cosmic finality does not establish identity of mechanism.

## IV. $\Lambda$ CDM COSMOLOGY, EVENT HORIZONS, AND EXISTENTIAL-RISK MITIGATION

### 1. Accelerated Expansion and Causal Horizons

The standard  $\Lambda$ CDM model describes a universe containing ordinary matter, dark matter, radiation, and a component represented by a cosmological constant  $\Lambda$ . Under the familiar late-time  $\Lambda$ -dominated scenario, the expansion of the universe accelerates. The precise future depends on the actual dark-energy physics, so the discussion here is conditional: if the late-time expansion remains sufficiently close to a positive cosmological constant, the universe develops a future causal structure in which some distant events can never communicate with a given worldline.

This is a statement about causal reachability, not about local motion exceeding the speed of light. General relativity permits the proper distance between sufficiently separated comoving regions to increase at an effective rate greater than  $c$  because the expansion is described by the spacetime metric. Local observers do not thereby violate special relativity. The event horizon is instead determined by whether a future-directed light signal emitted at a given time can ever reach a specified observer.

The long-term astrophysical consequences are substantial. Gravitationally bound systems remain bound because local gravitational attraction dominates the expansion at those scales, while sufficiently separated structures recede from one another as the cosmic scale factor evolves. Over enormous timescales, the observable universe accessible to a given civilisation can therefore become much smaller than the full spatial extent of

the universe. Cosmological isolation is thus a genuine physical phenomenon within the relevant class of models (Nagamine and Loeb 2003; Friedman, Kaiser, and Gallicchio 2013).

## 2. The Probability Model and Its Limits

The intuitive risk-mitigation argument can be represented as follows. Let  $N$  be the number of sufficiently isolated civilizational nodes and let  $p_i$  be the probability that node  $i$  is destroyed by a specified class of local hazards during a defined interval. If the destruction events are independent, the probability that every node is destroyed is approximately

$$R_N = \prod_{i=1}^N p_i.$$

If every  $p_i$  is bounded by some  $p < 1$  and the independence assumption remains valid, then  $R_N$  approaches zero as  $N$  grows. This mathematical result captures the intuitive advantage of redundancy. It does not establish that extinction becomes literally impossible. The model becomes unreliable if hazards are correlated or if the populations share a common vulnerability.

For example, a civilisation could distribute itself across galaxies yet remain dependent upon a common technological architecture, a shared artificial-intelligence substrate, a common physical constant, or a single cosmological process. A hazard that acts across all nodes would not be mitigated by spatial dispersion. Even ordinary local risks can become correlated through common decision-making, common information systems, or synchronised technological development. The proper conclusion is therefore conditional: spatial distribution reduces the risk of hazards whose causal domains are genuinely local and statistically independent (Bostrom 2013; Ord 2020).

This qualification is important because the theological comparison is strongest when the physical claim is stated accurately. The paper does not need to claim that cosmological isolation solves existential risk. It needs only the weaker proposition that causal isolation can reduce some classes of physically mediated global hazards. Once that proposition is accepted, the theological question becomes whether the same isolation can protect against divine judgment.

## V. THREE HERMENEUTICAL MODELS OF 2 PETER 3:10

### 1. Model A: Absolute Universal Annihilation

Under an annihilationist reading, 2 Peter 3:10 describes the dissolution of the present cosmic order in a comprehensive sense. The heavens pass away, the elements are dissolved by heat, and the earth and its works are subjected to judgment. If the entire spacetime order is included in the referent, event-horizon insulation offers no refuge. The event horizon is itself a feature of the spacetime geometry whose ultimate fate is at issue.

The logical structure is straightforward. An event horizon can prevent a physical signal from travelling between two regions only while the relevant spacetime structure continues to define those regions and their causal relations. If the eschatological event includes the transformation or dissolution of that structure, then the horizon cannot function as an independent shelter. It would be analogous to attempting to use the geometry of a map as protection against the destruction of the map itself.

Yet “annihilation” must be used cautiously. Christian eschatology frequently speaks not only of destruction but also of resurrection, renewal, restoration, and new creation. A strict doctrine of absolute non-continuity between old and new creation raises questions that 2 Peter 3 itself does not fully resolve. Model A therefore represents the strongest case for incompatibility between cosmic isolation and eschatological security, not a dogmatic assertion about the exact metaphysical mechanics of the end.

### 2. Model B: Transformative Refinement and Judicial Exposure

Model B emphasises *heuresetai* and the ethical context of verses 11–13. The earth and its works are exposed before divine judgment, while the present order undergoes purifying transformation. On this reading, the issue is not merely that matter is destroyed, but that creation is brought under divine disclosure. Hidden works become visible; moral reality can no longer be concealed by distance, technology, or historical circumstance.

This model is especially significant for cosmic dispersion. Spatial distance is relevant to communication between physical agents, but moral

accountability in Christian theology is not fundamentally a communication problem. A civilisation ten billion light-years away may be causally inaccessible to another civilisation, yet the theological claim of divine omniscience does not depend upon a signal from one civilisation reaching another. The distinction is between epistemic access within a physical system and divine knowledge of that system.

The argument must again avoid physicalizing theology. It is not necessary to say that God observes every civilisation by sending faster-than-light information packets. Such a statement would treat God as an extremely advanced observer inside the universe. Classical theism instead claims that God knows creatures as their Creator and sustains their existence. Thus, the relevant theological relation is not a superluminal communication channel but ontological dependence.

### 3. Model C: Localised or Biospheric Judgment

Model C restricts the language of 2 Peter 3:10 more narrowly to the terrestrial or phenomenological world known to the ancient audience. On this reading, "earth" and "heavens" describe the human cosmic environment rather than every galaxy or every causally disconnected region of the modern universe. Such a reading may preserve the rhetorical and ancient cosmological horizon of the text without requiring the author to make a modern claim about the global spacetime manifold (Moo 1996).

If Model C is adopted, the possibility of a genuine tension with future spacefaring civilisation emerges. Suppose descendants of humanity establish populations outside the Solar System and those populations become causally isolated from Earth. If the judgment described by the text is strictly local to Earth's biosphere, spatial dispersion could, in principle, protect distant populations from that particular physical event. The conclusion would not be that cosmic isolation defeats Christian eschatology, but that a localised interpretation limits the scope of the eschatological event.

Model C therefore represents the strongest counterpoint to the thesis of this paper. It also reveals why exegesis must precede metaphysical argument. The cosmological conclusion cannot determine the biblical meaning. If the text means local judgment, then local judgment is what the text

means regardless of whether future humans live in other galaxies. The interdisciplinary comparison becomes a test of interpretive consequences, not a method for selecting the interpretation.

## VI. FORMAL METAPHYSICAL COMPARISON: HORIZONTAL AND VERTICAL CAUSALITY

The central conceptual distinction can be formalised. Let a physical universe be represented by a spacetime manifold  $M$  equipped with metric  $g_{ab}$ . A physical hazard  $H$  is a process whose effects propagate through the causal structure defined by  $g_{ab}$ . If  $H$  cannot travel outside the relevant causal future of its origin, then a sufficiently isolated node may be physically insulated from  $H$ . In schematic form:

$H_A \rightarrow J+(A)$ , where  $J+(A)$  denotes the causal future of  $A$ .

A second node  $B$  lying outside the causal future of  $A$  cannot be physically influenced by  $H_A$  through an ordinary causal path originating at  $A$ . This is the mathematical intuition behind light cones. The event horizon extends the principle over cosmological time: some events remain permanently outside the causal reach of a worldline.

The theological relation is different. Let  $C$  denote the created order and  $G$  the Creator. In classical Christian metaphysics,  $C$  is contingent upon  $G$  not merely at an initial moment but in its continued existence. This is commonly expressed through *creatio continua* or divine conservation. The relation can be represented conceptually as:

$C = \text{contingent}(M, g_{ab}, \text{matter}, \text{laws}, \text{history})$   
 $\rightarrow G$  as sustaining ground.

This notation does not describe an empirical equation. It marks a metaphysical dependence relation. If God is the sustaining ground of spacetime, then separating one physical region from another does not separate either region from God. The causal independence of  $A$  and  $B$  relative to one another does not entail ontological independence of  $A$  and  $B$  from their Creator.

This yields the key proposition: physical causal independence does not entail metaphysical independence. The event horizon can block the propagation of a physical hazard from  $A$  to  $B$  without establishing that  $B$  is beyond the scope of a

theological claim about divine judgment. The distinction is analogous to the difference between “cannot receive a physical signal from X” and “does not depend for its existence upon Y.” These are not equivalent propositions.

The formal risk model can therefore be separated into two layers. For a purely naturalistic model, let  $R_N$  be the probability that all  $N$  isolated populations are destroyed by a class of local hazards. Under suitable independence assumptions,  $R_N$  decreases as  $N$  increases. For an eschatological model, however, the relevant event  $J$  is not a hazard transmitted from one node to another. Instead,  $J$  is a theological predicate concerning the created order as a whole. The probability statement cannot legitimately be written as  $P(J_B \mid \text{distance from } A)$  in the same way as a physical risk. Distance is simply not the relevant variable.

This does not mean that theology supplies a hidden empirical force that bypasses relativity. It means that the physical model and the theological model answer different questions. Relativity describes constraints on physical causal propagation within spacetime. Theology, when making a doctrine of judgment, speaks about the relation between God and creation. A category mistake occurs when the second claim is forced into the causal grammar of the first.

## VII. COSMOLOGICAL ISOLATION AND THE LOGIC OF EXISTENTIAL RISK

The comparison with existential-risk theory becomes especially interesting when total extinction is distinguished from the destruction of a civilisation. A distributed civilisation may survive a local disaster while losing communication with other populations. Conversely, a civilisation may become physically dispersed but culturally or technologically fragile. Spatial redundancy is therefore not sufficient; resilience requires independence across multiple dimensions, including energy sources, ecological systems, information architectures, reproductive capacity, and governance.

This insight parallels the theological argument in an unexpected way. The physical strategy of dispersion assumes that security can be produced by reducing shared causal dependencies. The theological message of 2 Peter 3:10–13 challenges

the assumption that ultimate security is a property of spatial architecture. The text directs attention instead to moral and covenantal reality: patience, repentance, holiness, righteousness, and the promise of new creation.

The difference can be expressed through two optimisation objectives. The existential-risk engineer seeks to minimise correlated physical failure: minimise shared exposure, maximise redundancy, and establish independent survival nodes. The eschatological theologian asks a different question: what is the proper orientation of finite creatures toward the Creator and the promised consummation of creation? One objective is resilience under natural hazards; the other is reconciliation and faithful existence before divine judgment.

These objectives need not conflict in practical life. Christian theology does not require negligence toward physical risk. Building resilient societies, protecting human life, reducing catastrophic risks, and exploring space can be understood as forms of stewardship. What the eschatological argument denies is that technological resilience can become metaphysical salvation. A civilisation may escape a supernova, a pandemic, or a planetary catastrophe without escaping the theological problem of creaturely accountability.

The distinction is particularly relevant to contemporary visions of multiplanetary civilisation. If humanity establishes settlements on Mars, moons, asteroids, and eventually distant stars, the moral imagination of civilisation will increasingly be shaped by distance. The farther populations are separated, the less practical control one community can exert over another. The universe may become politically and informationally plural. Yet a Christian account of divine judgment would not necessarily become plural in the same sense. The multiplication of physical nodes does not imply the multiplication of ultimate authorities.

There is also a philosophical issue concerning probability. Existential-risk models often work with expected probabilities over future hazards, while eschatological theology includes an event whose timing is explicitly described as uncertain. The “thief” metaphor undermines confidence in predictive control. A civilisation may extend its planning horizon to millions or billions of years, but

the text's theological warning is not that humanity lacks sufficient computational power. It is that the future is ultimately governed by divine promise rather than by human mastery.

### VIII. STOIC EKPYROSIS AND CHRISTIAN ESCHATOLOGY

The comparison with Stoic ekpyrosis clarifies the distinctive structure of Christian eschatology. Stoic cosmology, in its classical form, was associated with periodic cosmic conflagration followed by renewal in a cyclical order. The cosmos was understood through an immanent rational principle, and cosmic destruction belonged to the rhythm of the universe itself. The fire was therefore internal to the cosmological process.

Second Peter's vision is structurally different. The "day of the Lord" is not simply the next phase of a recurring physical cycle. It is an eschatological event tied to divine judgment, moral accountability, patience, promise, and a new creation in which righteousness dwells. The temporal structure is linear and teleological. Creation has a direction toward consummation rather than merely repeating an eternal cycle (Neyrey 1980).

This distinction also affects existential-risk thinking. If cosmic destruction were a periodic physical process governed by discoverable laws, a sufficiently advanced civilisation might attempt to forecast or manipulate the process. The Christian eschatological event is not presented as a technological problem. Its unpredictability and theological meaning resist reduction to engineering. The appropriate response in the text is ethical formation rather than technological escape.

The contrast should not be exaggerated into a claim that Stoic thought was simply "scientific" and Christianity simply "supernatural." Ancient Stoic cosmology was itself metaphysical, theological, and physical at once. The more precise difference concerns the source and purpose of cosmic transformation. Stoic conflagration belongs to the internal rational order of the cosmos; 2 Peter's judgment is anchored in the Lord's sovereign action and culminates in a promised order characterised by righteousness.

### IX. DISCUSSION: WHAT THE LIGHT-CONE ANALOGY CAN AND CANNOT ESTABLISH

The interdisciplinary argument produces four principal findings. First, cosmological event horizons are relevant to existential-risk mitigation only under a restricted class of hazards. They can reduce the ability of physical disasters to propagate between causally separated regions, but they do not guarantee independence or eliminate common-cause risks. Second, the future of the universe is model-dependent. The familiar  $\Lambda$ CDM scenario provides a coherent baseline for discussing causal isolation, but it should not be treated as a metaphysical prophecy about the ultimate destiny of the cosmos. Third, the textual and theological structure of 2 Peter 3:10–13 does not describe the eschaton as an ordinary physical hazard moving through space. Fourth, the strongest challenge to the paper's conclusion is a localised reading of the passage, because such a reading could in principle allow distant offworld populations to escape a geographically restricted judgment.

A major novelty of the analysis lies in reframing the issue from "Can God cross the event horizon?" to "What kind of causal relation is being claimed?" The first question is misleading because it imagines God as a physical agent travelling across spacetime. The second question is philosophically cleaner. If divine action is understood as an ontological relation between Creator and creation, then the causal structure of spacetime cannot function as a metaphysical boundary against God. If, alternatively, the theological claim is interpreted as a physical event occurring only within a restricted region, then ordinary causal horizons become relevant. The dispute is therefore not between theology and relativity as rival physics theories; it is between different accounts of what the eschatological claim means.

A second contribution concerns the use of "non-locality." In contemporary physics, non-locality has technical meanings associated with quantum theory and correlations, and those meanings should not be casually transferred to theology. Divine omnipresence is not quantum entanglement. The phrase "vertical causality" in this article is intentionally metaphysical. It identifies a dependence relation that is not measured by spatial distance. This distinction prevents the paper from making a category error of its own.

A third contribution concerns the relation between judgment and disclosure. If heuristics are given substantial interpretive weight, the end is not merely the destruction of a physical container but the unveiling of the moral reality of creation. In this model, the strategy of hiding from catastrophe by moving farther away is transformed into a theological question about whether distance can hide works from divine judgment. The answer, within the logic of the passage, is no. The ethical emphasis of verses 11–14 confirms that the eschatological question is not “Where can we hide?” but “What kind of people ought we to be?”

A fourth contribution concerns the concept of salvation. Existential-risk mitigation seeks to preserve future human value by preventing extinction. Christian salvation, however, is not reducible to biological or civilizational persistence. A civilisation could survive indefinitely and still fail to satisfy the theological meaning of redemption. Conversely, the promise of new creation suggests that the Christian hope is not simply survival of the present technological order. The eschatological horizon is transformed creation, not merely indefinite extension of the status quo.

This distinction has practical implications for theology and science communication. Christian theology should not use speculative cosmology as proof of biblical prophecy. Likewise, scientific cosmology should not be used to dismiss theological claims merely because a physical mechanism cannot be found for them. A responsible interdisciplinary approach recognises methodological boundaries. Cosmology asks how the universe behaves under specified physical laws and models. Exegesis asks what a text communicates in its linguistic, literary, historical, and canonical context. Metaphysics asks what kinds of causal or ontological relations are possible. The dialogue becomes fruitful when each discipline is allowed to make the claims appropriate to its own method.

## **X. CONCLUSION: THE LIMITS OF PHYSICAL SAFETY**

The prospect of cosmic isolation creates one of the most intriguing intersections between contemporary cosmology and existential-risk theory. In a universe with sustained accelerated expansion, sufficiently distant regions can become

causally disconnected. If intelligent life spreads across such regions, the probability of total extinction from strictly local and independent hazards can decline substantially. This is a meaningful insight into physical resilience, although its quantitative strength depends on assumptions about independence, correlation, and the future cosmological model.

The theological claim of 2 Peter 3:10 is categorically different. The “day of the Lord” is presented as an eschatological event in which the present heavens and earth are subjected to divine judgment, followed by the expectation of new heavens and a new earth. Whether the passage is interpreted as cosmic annihilation, transformative exposure, or a more localised judgment, its theological significance cannot be reduced to the propagation of a physical hazard through spacetime.

The decisive point is therefore not that divine action is “faster than light.” Such language would misunderstand both relativity and classical theism. The decisive point is that a light cone defines physical causal accessibility within spacetime, whereas divine sovereignty, in Christian metaphysics, concerns the relation of the entire created order to its Creator. A causal horizon can separate two civilisations without separating either civilisation from God. Spatial distance is therefore a powerful physical variable but not an ultimate metaphysical refuge.

The localised reading remains a legitimate interpretive challenge. If 2 Peter 3:10 is restricted to the ancient author’s terrestrial and visible cosmic horizon, future interstellar civilisations would raise questions that the original text could not have explicitly addressed.

But that result would be an implication of a particular hermeneutic, not a deduction from cosmology. The text itself culminates in a new creation where righteousness dwells, suggesting that its deepest concern is not the geography of destruction but the moral and theological transformation of creation.

The final implication is both scientific and theological. Science can extend the radius of human survival, but it cannot by itself answer the question of ultimate meaning or judgment. Technology can distribute life across light cones, but it cannot turn creaturely existence into metaphysical

independence. The farther humanity travels into the cosmos, the more clearly the distinction may become visible: physical distance can separate communities from one another, but it cannot by itself answer the question of what creation is for.

Thus, the eschatology of light cones should be understood as a conceptual boundary marker. Event horizons describe the limits of physical communication; 2 Peter 3 describes the limits of human presumption. The former asks how far a signal can travel. The latter asks whether distance can secure the creature against divine judgment. Within the theological worldview of the text, the answer is no. Ultimate safety is not achieved by escaping across cosmic distance, but by the promise of a creation in which righteousness dwells.

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## XII. DECLARATIONS

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**Conflict of interest:** None declared.

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