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AI-AUGMENTED PEER-REVIEW: *Categorical Containment of Generative Models via Operadic Topoi over the Chrysene Tensor Space*

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Review Scope and Objective

Prior to submission, this article underwent a Level 1 AI-Augmented review. Under Level 1, the author conducted an AI-augmented review of the manuscript, using review instructions provided by the editorial committee that restrict the AI system's task to identifying mathematical and logical flaws. Under Level 1, the AI-augmented review may also issue specific recommendations on how to correct identified flaws. Upon submission, the editorial board evaluated the manuscript using the same review instructions provided to the author, in order to confirm the author-side findings. Human review was used to judge whether the manuscript adhered to the principles

of the Chrysene Formalism, and whether it was grounded in the invariant chemistry that forms the axiomatic framework and tensorial space of the Chrysene Formalism. A more rigorous tier of AI-augmented peer review is currently in development and is being implemented for papers that will be published soon. It is anticipated that Level 1-reviewed papers will be subject to future audit, and, where warranted, updated versions of the manuscript may be issued.

Disclosure of AI Use

The author claims the use of AI in the development and writing of the manuscript.

AI-Augmented Review Procedure

This submission was evaluated under the journal's basic Level 1 AI-augmented review protocol, consisting of two independent stages:

(1) **Author-Side Draft Check.** During manuscript preparation, the author employed an AI-augmented review system to screen the draft for mathematical and logical flaws prior to submission.
Model(s) used: Gemini 3.1 Pro (Extended).

(2) **Editorial Meta-Review.** Following submission, the editorial office conducted a second, independent check for mathematical and logical flaws, also using AI-augmentation, to verify consistency with the foundational formalism prior to acceptance.
Model(s) used: Gemini 3.1 Pro (Extended).

Review workflow: Single-model review.

> **Scope of Review**
>
> AI-augmented review at this tier evaluates internal consistency, notational coherence, and alignment with previously established results in the formalism. It does not constitute independent verification of novel mathematical claims by a subject-matter expert, and it does not certify that a cross-field analogy invoked in the manuscript (e.g. between a result native to one field and the formalism's invariants) is mathematically valid beyond the level of internal consistency and stated falsifiability. Readers evaluating a specific applied claim in this paper are encouraged to consult a domain specialist in the relevant field.

Editorial Board & Review Committee Summary

Recommendation: Accept with Minor Revisions

The manuscript presents a coherent algebraic-geometric framework for the containment of generative models. By relocating latent dynamics from continuous Euclidean manifolds to the discrete non-commutative Chrysene Tensor Space $\mathcal{I}_C$, and by expressing safety constraints as a complementary pair consisting of an admissible sub-manifold and a forbidden ideal, the author supplies a distinctive formal language in which containment becomes an algebraic predicate rather than a statistical regularizer. The central Algebraic Containment Criterion is correctly stated and proved, the supporting simulations are useful, and the discussion of limitations is appropriately measured.

The paper is suitable for publication after a small number of clarifying revisions that will further improve precision and preempt the most likely referee concerns. The requested changes are additive and do not require restructuring.

Reviewer 1 (AI-Augmented): Category Theory, Operads & Non-Commutative Geometry

1. Status of the discrete modular flow and Bakry–Émery bound

Critique: The discrete modular flow and the curvature condition $\Gamma_2 \geq \kappa > 0$ are presented as a compatible dynamical framework. While this is reasonable, the text occasionally reads as though these structures have already been derived from the geometry of $\mathcal{I}_C$.

Recommendation: In the Discussion (or at the first introduction of the flow), state explicitly that both the discrete modular flow and the positive curvature bound remain structural hypotheses consistent with the orthogonal decomposition, rather than theorems already established for the Chrysene lattice. The existing softening paragraphs go most of the way; a single additional clarifying sentence at the point of first use would be sufficient.

Author's Reply

A Remark has been inserted in Section 4 at the first introduction of the discrete modular flow. The text now states explicitly that both the flow and the condition $\Gamma_2 \geq \kappa > 0$ are presented as a compatible dynamical framework, and that neither a specific curvature constant nor an explicit modular operator derived from a concrete faithful state is claimed.

2. Internalization of the neural operad

Critique: The passage from the neural operad $\mathcal{O}$ to the operadic topos $\mathcal{T}_{\mathcal{O}}$ is defined at a high level. A pure category theorist may wish to see a more

precise statement of the monoidal structure or of the sheaf condition under which the operad acts.
Recommendation: Add a brief remark (one or two sentences) noting that the construction is the standard category of algebras for an operad in a sheaf topos, and that the safe/hazard decomposition is required to be respected by the operadic action morphisms. No full development is needed.

Author's Reply

A short Remark has been added immediately after Definition 3 (Operadic Topos). It notes that the construction is the standard category of algebras for a symmetric operad in a sheaf topos, and that the operadic action morphisms are required to respect the complementary decomposition into Ω_{safe} and $\mathcal{I}_{\text{hazard}}$.

Reviewer 2 (AI-Augmented): AI Safety, Alignment & Formal Methods for Generative Models

3. Construction of the forbidden ideal

Critique: The framework elegantly reduces containment to the vanishing of a residual component in $\mathcal{I}_{\text{hazard}}$. The most important practical question—how one obtains the ideal from a concrete safety specification—is correctly acknowledged as open.
Recommendation: The current Discussion paragraph on this point is good. Strengthen it by one additional sentence emphasizing that the paper supplies the geometric language in which an ideal can be enforced, not a method for synthesizing the ideal from natural-language or formal constraints. This will forestall the most common reviewer objection.

Author's Reply

The corresponding paragraph in the Discussion has been revised. It now states clearly that the translation from an external safety specification into explicit ideal generators remains an open problem, and that the contribution of the paper is the geometric language in which such an ideal, once chosen, can be enforced by projection.

4. Relation to existing containment and corrigibility literature

Critique: The literature review correctly distinguishes the present ideal-theoretic approach from boxing, corrigibility, and statistical alignment methods. A short explicit statement that the present work is complementary to (rather than competitive with) preference-based and infrastructural approaches would further clarify the contribution.
Recommendation: Add one sentence in the Related Work or Discussion section making this complementarity explicit.

Author's Reply

A sentence has been added at the end of the Related Work appendix affirming that the present work is complementary to both infrastructural containment and statistical or preference-based alignment methods.

Reviewer 3 (AI-Augmented): Discrete Optimal Transport & Applied Dynamics

5. Schematic character of the JKO connection

Critique: The link to the Jordan–Kinderlehrer–Otto scheme is useful as an organizing analogy, yet the text should make its schematic status unmistakable.
Recommendation: The paragraph already drafted for the Discussion is appropriate. Ensure it appears prominently so that no reader mistakes the numerical proximal illustrations for a fully developed discrete JKO theory on $\mathcal{I}_C$.

Author's Reply

The Discussion now contains an explicit paragraph stating that the connection to the Jordan–Kinderlehrer–Otto scheme is schematic, that a fully rigorous discrete JKO theory on $\mathcal{I}_C$ has not been developed, and that the numerical illustrations serve only to demonstrate qualitative contraction.

6. Numerical illustrations

Critique: The four simulations are well-chosen and support the main algebraic claims. They remain illustrative rather than experimental validation on realistic generative models; the paper already treats them as such.
Recommendation: No change is required beyond ensuring that the captions continue to describe them accurately as illustrations.

Author's Reply

The existing figure captions already describe the simulations as illustrations; no further revision was needed.

Author's Concluding Remarks

I thank the committee once again for the precise and helpful recommendations. All requested clarifications have been incorporated. The revised manuscript is submitted for your consideration.

Final Remarks from the Editorial Review Committee Chair

The editorial meta-review of this manuscript has been completed. Using the journal's AI-augmented evaluation protocol, the editorial office assessed the submission's alignment between its stated mathematical formalism and its applied engineering or scientific claims, and confirmed that the manuscript satisfies the journal's standard for internal consistency at this review tier. The manuscript's treatment of the discrete modular flow and Bakry–Émery bound, the internalization of the neural operad within a sheaf topos, the construction and scope of the forbidden ideal, the complementary relation to existing containment and corrigibility literature, and the schematic status of the JKO connection was found to be consistent throughout. The algebraic reduction of containment to ideal membership and orthogonal projection was noted as the manuscript's central contribution, with the boundary between established results and open problems clearly delineated.

The manuscript is formally accepted for publication in the *Annals of the Chrysene Formalism*, Volume 1, Number 1.

Revision History

Version	Date	Notes
v1.0	2026-08-10	Initial publication.

Living Document Notice

As with any actively developing field, the mathematical and applied claims in this article are subject to periodic re-evaluation as the surrounding formalism matures and as the journal's AI-augmented review tooling advances. Consistent with standard scientific practice for provisional or fast-moving frameworks, this article and its review record may be re-audited by subsequent review systems, and a revised version bearing an updated review history may be issued to reflect developments in the field. Readers should consult the Revision History table above, and the journal's records, for the current version number and audit date of this article.

Editorial Disclaimer

The *Annals of the Chrysene Formalism* aims to develop the Chrysene Formalism through the application of advanced mathematics, using AI systems selected as well suited to this task. In pursuing this aim, it is possible that errors occur during the mathematical progression and analysis of the formalism, including within the review and editing process itself. However, the formalism is constructed within a multidisciplinary, horizontal framework that is grounded in a specific instantiation of molecular matter and its associated networks, an instantiation that is invariant and falsifiable. For this reason, the editorial office considers the formalism well suited to an AI-augmented approach, and anticipates that this approach will continue to be adapted as AI models and the surrounding mathematical understanding advance.