

ADDENDUM: Structural Application of the Unified Mathematical Taxonomy to the QEIS Framework

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Summary of Unified Mathematical Taxonomy

The Unified Mathematical Taxonomy (UMT) introduces a structural reformulation of quantum and observational mechanics, consisting of five foundational pillars:

1. Projection Logic Framework

$$P = \text{Tr}[\text{Proj}(U \mid \psi\rangle)]$$

Energy transfer and system evolution occur only when the state vector aligns with a projected subspace. This eliminates the need for arbitrary current or classical trigger logic.

2. Structural Operator Dynamics

$$|\psi(t)\rangle = U(t) |\psi(0)\rangle$$

System evolution unfolds deterministically under unitary transformation. Behaviour is not caused, it is permitted by encoded dynamics.

3. Entropy Information Convergence

$$S = -\text{Tr}(\rho \log \rho)$$

Energy routing and coherence are functions of entropy alignment. Divergence reflects informational misfit, not system failure.

4. Subspace Relation Encoding

$$R(\psi) \subseteq H_0 \otimes H_1$$

Energy transactions, tunnelling events, and coherence management operate through subspace relation, not classical feedback control.

5. Canonical Equilibrium Constraints

$$\nabla H = 0$$

Stability is governed by structural convergence, not active regulation. Equilibrium is an encoded final state, not an engineered approximation.

The full taxonomy is available at: <https://doi.org/10.5281/zenodo.15334619>

Retrospective Integration with QEIS

Originally conceptualised as a passive, decentralised energy substrate using vacuum harvesting and kinetic redirection, the **QEIS** system was positioned as a hardware-side architecture for coherence-preserving energy delivery in quantum computing environments.

At the time of publication, **QEIS** was structurally defined but lacked formal mathematical encoding for its systemic behaviours. It proposed vacuum-compatible energy regulation via sublimation, nano-event harvesting, and phase-matched redirection, but these mechanisms remained ungrounded in first-principle determinism.

With the introduction of **the Unified Mathematical Taxonomy**, the **QEIS** model is no longer conceptual. It is structurally viable.

Taxonomic Clarification of QEIS

1. Energy Logic and Routing Projection Logic redefines **QEIS's** energy transfer not as signal delivery, but as a permissioned event under subspace alignment. Energy is routed when it structurally can be, not when it is told to be. This resolves the question of switchlessness.
2. Stability Without Feedback Canonical Equilibrium Constraints justify **QEIS's** passive equilibrium logic. There is no need for dynamic regulation or cryogenic balancing. Systemic convergence is achieved structurally, not mechanically.
3. Entropy-Governed Activation Entropy Convergence shows that **QEIS** modules may be activated only when environmental entropy misalignment permits clean routing. This introduces informational eligibility as a condition of functionality, not voltage application.
4. Subspace-Encoded Tunnelling Vacuum tunnelling and energy redirection layers are now functionally understood as subspace relation exchanges. **QEIS** becomes a coherent intermediary layer, not a speculative supplement.
5. Structural Operator Alignment Every **QEIS** circuit is now interpretable through operator dynamics. Sublimation, harvesting, and routing are not control commands, they are temporal unfoldings of $U(t)$ acting on structural boundary states.

Conclusion

With the **Unified Mathematical Taxonomy** now in place, **QEIS** is no longer a conceptual innovation or architectural suggestion. It is the first energy substrate structurally aligned with quantum mechanics as reformulated under projectional and entropic constraint.

QEIS reframes energy interaction not as applied force, but as permitted structure. It defines a system where routing is not controlled, but conditionally expressed under encoded geometry.

In practical terms, **QEIS** reduces the need for centralised cryogenic lines, embedded classical controllers, and external switching logic. It introduces an energetic logic that is projectional, coherent, and fundamentally embedded within the structural reality of the processor space itself.

This reframing positions **QEIS** as a viable foundational layer in future coherence-preserving, tunnelling-oriented quantum computing systems. It may also serve as the basis for energy-autonomous modules in remote vacuum environments or embedded low-interaction circuits.

The Unified Mathematical Taxonomy has rehabilitated the QEIS system from a conceptual mechanism to a deterministic substrate.