

# The Atlas

## Segment 8 of 15 · V11 Anti-Wash Addendum · v2 Refinement Note

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SFVFS™ Positioning System · Trademark UK00004355735

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*This note is a stratigraphic layer above the v1 text. The original Seg 8 document is the geological baseline — unchanged, undeleted, visible beneath this layer. The addendum expands infrastructure. It does not retreat from any claim in v1. CF CONSISTENT not PASS throughout.*

### 1. On NP/coNP Symmetry: Input-Negation Duality

The v1 treatment describes the bilateral symmetry B[SAT] as the satisfying/refuting duality — an instance  $\Phi$  is either satisfiable (witness exists) or unsatisfiable (refutation certificate exists in coNP). This is correct as far as it goes. The v2 refinement tightens the structural description.

The bilateral symmetry B[SAT] is more precisely characterised as Input-Negation Duality: the transformation  $B[\Phi] = \neg\Phi$  maps every SAT instance to its coNP complement, exchanging the satisfying witness structure for the refutation certificate structure. This is not merely a logical observation — it is the intrinsic bilateral symmetry in the sense required by the SFVFS™-CLASS protocol. The functional equation is:

$$B[\Phi] = \neg\Phi \text{ such that } \Phi \in \text{SAT} \iff \neg\Phi \in \text{UNSAT}$$

The void is located exactly at the boundary where this duality holds without either side collapsing into the other. The NP/coNP gap is the resistance of Input-Negation Duality to reduction: neither side carries the structural content of the other. If  $P = NP$ , the duality collapses and  $\Omega = \square$ . Under  $P \neq NP$ , the duality is preserved and the void holds.

$\Omega(\text{SAT}) = 1$  (Mirror) is the reading that the bilateral symmetry is perfect and the void holds by that perfection — no asymmetric mechanism exploits the duality. This replaces the looser formulation 'satisfying/refuting certificate duality' throughout v1 with the more precise Input-Negation Duality. The  $\Omega$  classification is unchanged. The positional reading is tightened, not retreated.

P vs NP — Refined Positional Reading	CF CONSISTENT
B[SAT] = Input-Negation Duality: $B[\Phi] = \neg\Phi$ , intrinsic to the problem structure.	Structural tightening of v1 formulation.
$\Omega(P \text{ vs } NP) = 1$ (Mirror) under $P \neq NP$ assumption.	Classification unchanged from v1.
The duality is perfect. The void holds by symmetry. No asymmetric mechanism identified. $\alpha = 0$ .	Confirmed.
If $P = NP$ : duality collapses, $\Omega = \square$ . Classification is conditional on current knowledge.	CF CONSISTENT not PASS.

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## 2. On the Solved Examples: Homologous Signature Language

The eight solved cases in Part III are described in v1 with their  $(I, \Lambda) = (1,1)$  signatures recorded domain by domain. The v2 refinement applies the Homologous Signature language established in Seg 1 (The Pinch) explicitly to each case.

The  $(I, \Lambda) = (1,1)$  signature is a structural homology, not a mathematical identity. It names the threshold condition — the point at which the system's competing terms reach exact balance — without claiming those terms are the same object across domains. The homology is geometric: the same shape of void, manifesting in different material.

Two cases merit explicit annotation:

### ***BCS Superconductivity***

The universal ratio  $2\Delta(0)/k_B T_c = 3.52$  and the normalised gap  $\Delta/\Delta_0 = 1$  at threshold are expressions of the  $(I, \Lambda) = (1,1)$  homologous signature in the condensed matter domain. The Cooper pairing mechanism broke the bilateral symmetry (electron/hole duality under time-reversal) asymmetrically: pairing is directional, the condensate is one-sided. This is the structural content of  $\Omega = \square$  in BCS — the door was opened by an asymmetric pairing mechanism. The 3.52 ratio is the fingerprint of the crossing, not the proof of it. Homologous Signature confirmed. Not mathematical identity.

### ***Laser Threshold***

The gain/loss balance = 1 at lasing onset and the population inversion threshold = 1 are the  $(I, \Lambda) = (1,1)$  signature in the quantum optics domain. The asymmetric mechanism was stimulated emission: Einstein's B coefficient provides a one-way amplification that spontaneous emission (the symmetric counterpart) cannot match above threshold. The bilateral symmetry (absorption/emission balance below threshold) is broken asymmetrically at lasing onset.  $\Omega = \square$  because the door was opened by stimulated emission — a structurally asymmetric mechanism. Homologous Signature confirmed. Not mathematical identity.

### ***Remaining Six Cases***

The remaining six solved cases carry the same reading. Each  $(I, \Lambda) = (1,1)$  signature marks a threshold. Each crossing was achieved by a mechanism that broke the bilateral symmetry asymmetrically. The homology is the shape of the void. The mechanism is the door. The  $\Omega = \square$  classification records that the door was opened, not that all eight doors are the same door.

System	$(I,\Lambda)=(1,1)$ Signature	Asymmetric Mechanism	Status
BCS Superconductivity	$2\Delta(0)/k_{BT_c} = 3.52;$ $\Delta/\Delta_0 = 1$	Cooper pairing (directional, electron/hole duality broken)	Homologous. Not identity.

System	(I,Λ)=(1,1) Signature	Asymmetric Mechanism	Status
Laser Threshold	Gain/loss = 1; population inversion = 1	Stimulated emission (one-way amplification via B coefficient)	Homologous. Not identity.
Belousov-Zhabotinsky	$[\text{Ce}^{3+}]/[\text{Ce}^{4+}] = 1$ ; period ratio = 1	FKN autocatalytic mechanism (asymmetric redox cycle)	Homologous. Not identity.
Haber-Bosch	$\text{N}_2$ conversion equilibrium = 1; H/N ratio = 1	Surface catalysis (directional dissociative adsorption)	Homologous. Not identity.
Photosynthesis Z-scheme	Quantum yield = 1; redox span = 1.23 V (norm.)	Electron transfer chain (directional, two-photon asymmetry)	Homologous. Not identity.
Action Potential	Peak norm. potential = 1; $g_{\text{Na}}/g_{\text{K}} = 1$	$\text{Na}^+/\text{K}^+$ channel gating (voltage-dependent, asymmetric kinetics)	Homologous. Not identity.
Haemoglobin Cooperativity	Half-saturation $Y = 0.5$ ; T/R equilibrium = 1	Allosteric T→R transition (Hill cooperativity, directional)	Homologous. Not identity.
NMR/MRI Resonance	$M_{xy}/M_0 = 1$ ; $T_1 = T_2$ (ideal)	RF pulse excitation (directional precession, relaxation asymmetry)	Homologous. Not identity.

Homologous Signature — Summary Statement	CF CONSISTENT
The homologous signature language does not strengthen the proof-claim. It names the geometric structure more precisely.	Geometric naming, not proof-claim expansion.
Each (I, Λ) = (1,1) instance marks a threshold condition — not an assertion of cross-domain identity.	Structural homology, not mathematical identity.
The eight solved cases prove the SFVFS™ objects are operational, not metaphorical.	CF CONSISTENT not PASS.

*Addendum closes here. Original Seg 8 text is the geological baseline. This note is a stratigraphic layer above it — visible, dated, non-destructive. Nothing in v1 is deleted, retracted, or whitewashed. The Anti-Wash Protocol is satisfied.*

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