Wind-Down Status Snapshot: Learned Results, Open Proof Gates, and Handoff Queue

2026-02-09

Abstract

This note records a wind-down synthesis after scanning the active markdown corpus in the repository. It separates current scoped theorem-grade closure from remaining proof gates and leaves a concrete next-agent queue. The note is status-facing: it does not assert new physical theorems beyond already tracked artifacts.

1 Corpus and Method

The status pass scanned markdown artifacts under the active workspace (`rg --files -g '*.md'`), then extracted state-bearing signals (`done`, `closed`, `proved`, `queued`, `frontier`) and checked canonical paper and audit sheets.

2 What Is Learned

Goal 1 Papers

1. Paper 1 (statics): scoped theorem-grade static variational consistency and static measurement-layer equivalence are documented in `2026-02-09-claim1-paper1-static-amplitude-qm-equivalence.`
2. Paper 2 (dynamics): scoped theorem-grade dynamic consistency and path-integral-equivalence chain (with historical section) are documented in `2026-02-09-claim1-paper2-dynamics-path-integral`
3. Paper 3 (fields): the dimension-indexed program has progressed through AN-34A in a scoped $d = 3$ branch, including weighted-local and graph-decay nonlocal lifts with explicit denominator-rate bookkeeping and a first-principles shell-tail rate transmutation lane; Lean wrappers now package the exhaustion/regularization commuting-limit interface.

Top-10 Claim Snapshot

Using `2026-02-08-top10-claim-audit.md`:

1. strong scoped closure is already available for Claims 2, 3, 4, 5, 6, 7, 10,
2. Claim 8 has explicit unresolved high-dimensional rotating sectors,
3. Claim 9 has screened-Abelian theorem closure and scoped non-Abelian transfer lanes,
4. Claim 1 has high scoped maturity with explicit global interacting gap.

3 Open Proof Gates

Claim 1 Frontier

1. Next (field packaging): exhibit concrete exhaustion/regularization envelopes for the weighted-local graph-decay nonlocal channels and wire them into the AN-33L-C commuting-limit wrapper so the field-side statements can invoke the Lean wrapper without hidden hypotheses.

2. Full $d = 4$ interacting closure still requires explicit G2/G3 completion (continuum existence and reconstruction gates).

Claim 9 Frontier

1. Beyond-window transfer control needs first-principles completion and full propagation into paper and audit lanes.

2. A new AF draft lane is now recorded in `2026-02-09-claim9-nonabelian-firstprinciples-transfer-c` with executable diagnostic scaffold `claim9_nonabelian_first_principles_transfer_check.py`.

3. Dynamical-matter string-breaking crossover remains at program level.

Claim 8 Frontier

1. Unresolved $D \geq 6$ multi-spin rotating sectors remain explicit in the current theorem map.

4 Immediate Handoff Queue

1. Integrate AF lane into Claim 9 manuscript and audit only after validating the AF diagnostic and consistency checks in the same pass.

2. Start a dedicated theorem sheet for dynamical-matter string-breaking with explicit (G, D, N_f)-tagged assumptions and extraction regime.

3. Execute the field-side envelope instantiation and commuting-limit wiring step, then immediately synchronize Paper 3 under the existing paper update trigger rules.

5 Validation Contract

Assumptions

1. this report is a status synthesis, not a new theorem derivation,

2. all closure/open labels are inherited from tracked notes and reports.

Units and Dimensions

1. no new dimensional claim is introduced in this status document,

2. unit-sensitive statements are delegated to the cited theorem notes.

Symmetry/Conservation

1. no new symmetry or conservation claim is asserted here.

Independent Cross-Check Path

1. run markdown corpus scan commands,
2. compare extracted statuses with the audit and paper tracks listed above.

Confidence

High confidence for status extraction consistency. Medium confidence for frontier ordering, since ordering depends on strategic preference between Claim 1 and Claim 9 proof acceleration.

6 Reproducibility Metadata

1. date anchor: 2026-02-09 (US),
2. shell environment: `zsh`,
3. TeX build toolchain in this workspace: `/Library/TeX/texbin/pdflatex` (TeX Live 2025) via safe wrapper script.