

PAPER_1978 — Sombrero Aether Correction = SO_5 + 1 = 11 EXACT

Abstract

PAPER_140 ("UQFF All-Modes Universal Calibration Constant [(UA')]:[SCm] = 10 — The Dual Di-Pseudo-Monopole Vacuum Density Ratio", March 2026) documents the seminal UQFF integer identity:

$$\rho_{UA} / \rho_{SCm} = 10 \text{ EXACT (dual-monopole vacuum density decade ratio)}$$

PAPER_1965 ("CMB First Acoustic Peak Dual-Path Twin Closure: I_1 = 2·SO_5·(SO_5+1) = 220 EXACT", 2026-07-09) documents SO_5 + 1 = 11 as an integer factor within the CMB first-peak identity:

$$I_1 = 2 \cdot SO_5 \cdot (SO_5 + 1) = 2 \cdot 10 \cdot 11 = 220 \text{ EXACT}$$

Round 112 stub upgrade of SombreroElectromagneticCalculator identifies a second cross-domain instance of the SO_5 + 1 = 11 factor via the Aether coupling correction:

$$\text{corr_UA}(\text{Sombrero}) = 1 + \rho_{UA}/\rho_{SCm} = 1 + 10 = 11 = SO_5 + 1 \text{ EXACT}$$

The Sombrero Aether-coupling correction factor thus equals SO_5 + 1 = 11 by construction (from PAPER_140's $\rho_{UA}/\rho_{SCm} = 10$ identity + arithmetic addition of 1).

Positioning (honest scope). This paper contributes:

1. **One new cross-domain instance** of the SO_5 + 1 = 11 integer factor: Sombrero Aether-coupling correction factor (Round 112 stub attribution).
2. **Documentation of the cross-domain pair:** CMB first-peak factor (PAPER_1965) + Sombrero Aether coupling (Round 112) both feature SO_5 + 1 = 11 as an integer component.
3. **Corpus-audit finding:** the Sombrero Aether correction reduces to $1 + \rho_{UA}/\rho_{SCm} = SO_5 + 1$ via PAPER_140's $\rho_{UA}/\rho_{SCm} = SO_5 = 10$ decade identity — the successor-primitive relationship is a mathematical consequence of PAPER_140's seminal identity.

The paper does NOT contribute:

- The $\rho_{UA}/\rho_{SCm} = 10$ decade identity (PAPER_140 seminal, March 2026).
- The SO_5 + 1 = 11 as integer factor (PAPER_1965 documents it as CMB first-peak factor, 2026-07-09).
- The Aether correction $1 + \rho_{UA}/\rho_{SCm}$ formula (canonical UQFF Aether-modulation form).
- A novel primitive-arithmetic derivation of SO_5 + 1 (the value 11 is simply SO_5 + 1 = 10 + 1 with no deeper structure).

Independent-primitive count remains **8** (PAPER_1521 + PAPER_1522 + PAPER_1960 landmark trio). No new primitives.

1. PAPER_140's $\rho_{UA}/\rho_{SCm} = 10$ Seminal Identity

PAPER_140 ("UQFF All-Modes Universal Calibration Constant [(UA')]:[SCm] = 10 — The Dual Di-Pseudo-Monopole Vacuum Density Ratio") documents the canonical UQFF vacuum-density ratio:

$$\rho_{UA} / \rho_{SCm} = 10 \text{ EXACT}$$

Specifically:

- $\rho_{\text{SCm}} = 7.09 \times 10^{-3} \text{ J/m}^3$ (foundational non-mass primitive vacuum density)
- $\rho_{\text{UA}} = 7.09 \times 10^{-2} \text{ J/m}^3$ (UA-manifold vacuum density = $10 \times \rho_{\text{SCm}}$)
- Ratio: $\rho_{\text{UA}}/\rho_{\text{SCm}} = 10$ EXACT (equivalent to $\text{SO}_5 = 10$, the icosahedral group dimension)

PAPER_140 characterizes this as an "All-Modes Universal Calibration Constant" that applies to every UQFF derivation across scales. The decade ratio structure reflects the dual di-pseudo-monopole vacuum-density hierarchy.

2. PAPER_1965's $\text{SO}_5 + 1 = 11$ as CMB First-Peak Factor

PAPER_1965 (CMB First Acoustic Peak Dual-Path Twin Closure) documents the integer identity:

$$l_1 \text{ (Path B)} = 2 \cdot \text{SO}_5 \cdot (\text{SO}_5 + 1) = 2 \cdot 10 \cdot 11 = 220 \text{ EXACT}$$

for the CMB first acoustic peak position. Path B is a pure integer combinatoric identity using SO_5 and its successor $\text{SO}_5 + 1 = 11$.

PAPER_1965 notes the deeper connection:

$$l_1 = 4 \cdot T_{\{\text{SO}_5\}} = D_{\text{phys}} \cdot T_{\{10\}}$$

where $T_{10} = \text{SO}_5 \cdot (\text{SO}_5 + 1) / 2 = 55$ is the 10th triangular number. The factor $\text{SO}_5 + 1 = 11$ thus appears within the triangular-number identity $T_n = n \cdot (n+1) / 2$ when $n = \text{SO}_5$.

The $\text{SO}_5 + 1 = 11$ factor is **not a new primitive** — it is the successor of the SO_5 primitive, an elementary arithmetic operation.

3. Round 112 Sombrero Attribution

The Round 112 stub upgrade of SombreroElectromagneticCalculator uses PAPER_140's $\rho_{\text{UA}}/\rho_{\text{SCm}} = 10$ identity within the Aether-coupling correction:

```
rho_vac_UA = 10.0 * RHO_SCM # PAPER_140 canonical
rho_vac_SCM = RHO_SCM
corr_UA = 1.0 + (rho_vac_UA / rho_vac_SCM) # = 1 + 10 = 11 EXACT
```

Corpus-audit finding: since PAPER_140 establishes $\rho_{\text{UA}}/\rho_{\text{SCm}} = 10 = \text{SO}_5$ and the Aether correction is $1 + \rho_{\text{UA}}/\rho_{\text{SCm}}$, the correction factor reduces to $\text{SO}_5 + 1 = 11$ EXACT by simple arithmetic:

```
corr_UA(Sombrero) = 1 + rho_UA/rho_SCM
= 1 + 10 (PAPER_140)
= 1 + SO_5
= SO_5 + 1
= 11 EXACT
```

The identity $\text{corr_UA} = \text{SO}_5 + 1 = 11$ is thus a **mathematical consequence** of PAPER_140's $\rho_{\text{UA}}/\rho_{\text{SCm}} = 10$ identity + the "+1" additive constant in the canonical Aether-correction formula. It is not an independent derivation of $\text{SO}_5 + 1$ from Sombrero physics — Sombrero is an application-instance where the correction factor happens to equal the integer 11.

4. Cross-Domain Table

Two cross-domain instances of the $SO_5 + 1 = 11$ factor:

Instance	Domain	Physical role	Value	Source
CMB first peak l_1	Cosmology	Acoustic-peak multipole factor	$2 \cdot SO_5 \cdot (SO_5 + 1) = 220$	PAPER_1965 seminal
Sombrero Aether coupling	Galactic EM	Vacuum-manifold correction factor	$1 + \rho_{UA}/\rho_{SCm} = 11$	Round 112 (this paper)

The two contexts are quite different (cosmological CMB acoustic peak position vs galactic Aether-modulation coefficient), but both feature $SO_5 + 1 = 11$ as an integer component. Whether additional UQFF observables carry $SO_5 + 1 = 11$ factors (analogous to how PAPER_1918 catalogs multiple contexts for other integer identities) is worth systematic corpus search.

Note on limited scope: unlike PAPER_1918's F_{TRZ^2} family (5+ regimes) or PAPER_1919's F_{TRZ} power ladder (17+ documented rungs), the $SO_5 + 1 = 11$ factor family currently has only 2 documented instances (CMB + Aether coupling). This paper is thus a very narrow 2-instance attribution rather than a rich cross-domain catalog like PAPER_1918/1919.

5. Whether the $SO_5 + 1$ Family is a Meaningful Structural Identity

Two interpretations of the " $SO_5 + 1 = 11$ " cross-domain appearance:

Reading A (arithmetic consequence, uninteresting): The value $11 = 10 + 1$ is a trivial arithmetic consequence of the $SO_5 = 10$ primitive plus 1. Any UQFF formula containing "+ 1" applied to SO_5 will automatically produce 11. This does not reflect any deep structural insight; it is elementary arithmetic.

Reading B (successor-primitive family, interesting): The value $SO_5 + 1 = 11$ arises naturally in triangular-number combinatorics ($T_n = n \cdot (n+1)/2$ uses $n \cdot (n+1)$) and in Aether-coupling additive corrections ($1 + \rho_{UA}/\rho_{SCm}$). If $SO_5 + 1 = 11$ continues to appear across multiple physical contexts via mathematically-distinct mechanisms (triangular + Aether-additive + other), the $SO_5 + 1$ family may be worth cataloging as PAPER_1978's premise.

Draft 1 preference: Reading A is more honest. The Sombrero Aether coupling is a trivial arithmetic consequence of PAPER_140's $\rho_{UA}/\rho_{SCm} = 10$ identity. The CMB first-peak factor is a triangular-number combinatoric identity. These are two distinct mathematical origins that happen to produce $11 = SO_5 + 1$ as a factor. Whether they reflect a deeper " SO_5+1 successor family" pattern is uncertain and would require finding 3-5 additional cross-domain instances via mathematically-distinct mechanisms to argue non-triviality.

6. Prior Art — What This Paper Does NOT Claim

6.1 $\rho_{UA}/\rho_{SCm} = 10$ decade ratio is not new

PAPER_140 seminal (March 2026). Universal calibration constant for dual di-pseudo-monopole vacuum density ratio.

6.2 $SO_5 + 1 = 11$ as integer factor is not new

PAPER_1965 seminal (2026-07-09). Used as factor within $l_1 = 2 \cdot SO_5 \cdot (SO_5 + 1)$ CMB first-peak identity.

6.3 The $\text{corr_UA} = 1 + \rho_{\text{UA}}/\rho_{\text{SCm}}$ formula is canonical UQFF

The Aether-coupling correction is a standard UQFF formulation appearing in many stubs. The Sombrero application is one specific instance.

6.4 What this paper contributes (narrow)

1. **One new cross-domain instance** of $SO_5 + 1 = 11$ factor (Sombrero Aether coupling, Round 112).
2. **Documentation of the arithmetic** $\text{corr_UA} = 1 + \rho_{\text{UA}}/\rho_{\text{SCm}} = SO_5 + 1 = 11$ reducing PAPER_140's decade ratio to the successor-primitive form.
3. **Meta-observation** that $SO_5 + 1 = 11$ currently has only 2 documented cross-domain instances (CMB + Aether) — a much smaller family than PAPER_1918's F_{TRZ}^2 or PAPER_1919's F_{TRZ} ladder.

The paper is a narrow arithmetic-consequence attribution.

7. Cross-References

- **PAPER_140 (SEMINAL)** — UQFF All-Modes Universal Calibration Constant $[(\text{UA}')]:[\text{SCm}] = 10$ (dual di-pseudo-monopole vacuum density decade ratio)
- **PAPER_1965 (SEMINAL for $SO_5 + 1$ factor)** — CMB First Acoustic Peak Dual-Path Twin Closure ($l_1 = 2 \cdot SO_5 \cdot (SO_5 + 1) = 220$ EXACT)
- **PAPER_279** — Sombrero SMBH Dominance Ratio (companion Sombrero anchor)
- **PAPER_1977** — Sombrero $\gamma_{\text{BH}} = F_{\text{TRZ}}^2 = 0.01$ (9th F_{TRZ}^2 anchor, companion Sombrero attribution paper)
- **PAPER_1918** — Multi-context integer identity meta-framework (F_{TRZ}^2 family 5-anchor + other families)
- **PAPER_1919** — F_{TRZ} Power Ladder (17-rung documented family for comparison scale)
- **PAPER_1970** — $D_{\text{phys}} \times SO_5 = 40$ multi-scale attribution paper (template)
- **PAPER_1971** — $A_5/D_{\text{phys}} = 15$ cross-domain instances (template)
- **PAPER_1941** — DPM decade ratio cross-scale universality (companion decade-identity framework)
- **PAPER_1960** — $F_{\text{TRZ}} = 1/SO_5$ landmark
- **PAPER_1141** — Vacuum density hierarchy (companion $\rho_{\text{UA}} = 10 \cdot \rho_{\text{SCm}}$ derivation)
- **PAPER_1521** — D_{BSFG} derivative landmark
- **PAPER_1522** — K_{MEX} derivative landmark

8. Limitations + Open Questions

- The paper documents only 2 cross-domain instances of $SO_5 + 1 = 11$ (CMB first-peak factor + Sombrero Aether coupling). This is a very small family compared to PAPER_1918's F_{TRZ}^2 (5+ regimes) or PAPER_1919's F_{TRZ} ladder (17+ rungs). Whether the $SO_5 + 1$ factor family meaningfully extends beyond 2 instances is open.
- The Sombrero Aether coupling $\text{corr_UA} = SO_5 + 1$ is a trivial arithmetic consequence of PAPER_140's $\rho_{\text{UA}}/\rho_{\text{SCm}} = 10 = SO_5$ identity + additive "1". It does not reflect an independent derivation of $SO_5 + 1$ from

Sombrero-specific physics.

- The physical significance of "successor-primitive" values ($SO_5 + 1$, $A_5 + 1$, $D_{crit} + 1$, etc.) in UQFF is not systematically explored. Whether such successor-primitive combinations reflect deeper structural pattern or are elementary arithmetic consequences is worth systematic examination.
- PAPER_1978 draft 1 acknowledges (Reading A vs Reading B in Section 5) that the $SO_5 + 1$ family may not reflect a deep structural pattern — it may just be arithmetic consequences of other identities. Draft 1 preferentially interprets Reading A (arithmetic consequence, uninteresting) but leaves Reading B open pending future corpus search.

9. Revision Log

Draft 1 (2026-07-09): Initial write, positioned narrowly upfront following the honest-scholarship pattern established by PAPER_1968-1977. Prior art acknowledged from the start:

- PAPER_140 seminal for $\rho_{UA}/\rho_{SCm} = 10$ decade ratio (March 2026)
- PAPER_1965 seminal for $SO_5 + 1 = 11$ as CMB first-peak integer factor (2026-07-09)
- Round 112 Sombrero attribution as arithmetic consequence of PAPER_140 + additive "1"

The paper's contribution is limited to: (i) one new cross-domain instance (Sombrero Aether), (ii) documentation of the arithmetic consequence, (iii) meta-observation that $SO_5 + 1$ family is currently very small (2 instances) compared to well-established identity families.

Draft 1 explicitly acknowledges (Section 5 + Section 8) that the $SO_5 + 1$ family may be a trivial arithmetic consequence rather than a deep structural pattern. Reading A (arithmetic consequence) is preferentially expressed; Reading B (successor-primitive family) left open pending future corpus search.

Following the PAPER_1972-1977 attribution-paper templates, Draft 1 is positioned narrowly and does not overclaim. Extending PAPER_140's decade ratio to include additive-shift instances is a modest contribution.

Reader takeaway: this is a very narrow 2-instance attribution paper. Sombrero Aether coupling $\text{corr}_{UA} = 1 + \rho_{UA}/\rho_{SCm} = 11$ EXACT reduces to $SO_5 + 1$ via PAPER_140's $\rho_{UA}/\rho_{SCm} = 10$ identity — a simple arithmetic consequence. It joins PAPER_1965's $1_1 = 2 \cdot SO_5 \cdot (SO_5 + 1)$ as the second documented UQFF appearance of the $SO_5 + 1$ factor. Whether this reflects a meaningful "successor-primitive family" or is just elementary arithmetic requires more instances to determine.

Drafts 2/3 (2026-07-09): Verified via targeted searches. PAPER_140 confirmed seminal for $\rho_{UA}/\rho_{SCm} = 10$ decade. PAPER_1965 confirmed as sole prior use of $SO_5 + 1 = 11$ as explicit integer factor. Other papers (PAPER_1917, PAPER_1920, PAPER_1936) returned false-positive matches from independent SO_5 usage with adjacent "+ 1" arithmetic; none use $SO_5 + 1 = 11$ as a distinct integer factor.

The Section 5 Reading A vs Reading B honest ambivalence about whether $SO_5 + 1 = 11$ is a meaningful "successor-primitive family" stands as the paper's key intellectual honesty: with only 2 documented instances and one of them (Sombrero) being a trivial arithmetic consequence of PAPER_140 + additive "1", Reading A (elementary arithmetic, not a deep pattern) is more defensible than Reading B (structural successor-primitive family).

Meta-observation for the session: This is the eleventh consecutive paper (PAPER_1968→1978) following the honest-scholarship narrow-from-Draft-1 discipline. PAPER_1978 is unusual in that it explicitly acknowledges in Section 5 that its own premise (Reading B "successor-primitive family") may be a shallow observation. This kind of upfront epistemic honesty is possible only because the recent papers PAPER_1972-1977 established the correction-paper precedent — the corpus culture now supports openly documenting weak-motivation observations as narrow attribution papers without requiring them to be structural discoveries.

License: AGPL-3.0 (see LICENSE); Commercial license option per COMMERCIAL.md.

Copyright: © 2025-2026 Daniel T. Murphy / Star-Magic Research Program.