

NOS Electromagnetic Full Spectrum

Spherical Operational Phase-Quadrant Mapping

A Sub-Mechanical Field Breakdown of Photon Threading Through Inverse Phase Space

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Abstract

This document presents the complete electromagnetic spectrum (radio through gamma radiation) as an operational phase-quadrant mapping within the Nuijens Operating System (NOS) architecture. Using the inverse threading framework with resolution $R = 512$ and quadrant units $u_n = 1/128^n$, we demonstrate how all electromagnetic radiation reduces to 40 discrete phase positions across the angular domain $[-360^\circ, +360^\circ]$ with $360^\circ/360^\circ = 1$. Each 18° increment represents one inverse frequency octave, threading photons through four simultaneous quadrant processes: Q1 (quantum baseline), Q2 (gravity ground states), Q3 (thermodynamic flows), and Q4 (nuclear compression). Critical electromagnetic positions emerge geometrically: EM field ignition at -168.75° (bin 16, Q1) establishes $\alpha^{-1} = 137$, while absorption at $+191.25^\circ$ (bin 16, Q4) yields $T_{\text{CMB}} = \frac{256}{256} \times \frac{128}{47} = \frac{128}{47} \approx 2.7234$ in NOS units. This is not a toy model but an operational implementation showing matter unit allocation across electromagnetic phase positions via pure inverse ratios—no addition, no external constants.

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1 System Architecture

1.1 Foundation Parameters

The NOS electromagnetic spectrum operates on the following architectural parameters from the formal NOS framework:

- **Resolution:** $R = 512$ (quantum measurement baseline)
- **Angular domain:** $\theta \in [-360^\circ, +360^\circ]$ with $360^\circ/360^\circ = 1$
- **Quadrant boundaries:** $-360^\circ, -180^\circ, 0^\circ, +180^\circ, +360^\circ$
- **Threading units:** $u_n = 1/128^n$ for quadrant n
- **Phase structure:** $40 \text{ phases} \times 18^\circ \text{ per phase} = 720^\circ \text{ total cycle}$
- **Inverse counting:** $1 \rightarrow 1/2 \rightarrow 1/3 \rightarrow 1/Q$ (no accumulation toward infinity)

1.2 Quadrant Threading Units

$u_1 = \frac{1}{128} = 0.0078125$	(Q1: quantum baseline)
$u_2 = \frac{1}{128^2} = 6.1035 \times 10^{-5}$	(Q2: gravity ground states)
$u_3 = \frac{1}{128^3} = 4.768 \times 10^{-7}$	(Q3: thermodynamic flows)
$u_4 = \frac{1}{128^4} = 3.725 \times 10^{-9}$	(Q4: nuclear compression)

All quadrants run simultaneously from system boot (seam-1 singularity at $\theta = 0^\circ$).

1.3 Physical Unit Locations

Every physical quantity is a pure inverse ratio between threading units in known quadrant pairs:

$\text{Length} = \frac{u_1}{u_2} = 128$
$\text{Time} = \frac{u_2}{u_1} = \frac{1}{128}$
$\text{Energy} = \frac{u_1}{u_3} = 16384$
$\text{Temperature} = \frac{u_3}{u_4} \times \frac{256}{256} = \frac{128}{47} \approx 2.7234$

The only allowed modulation is the absorption overflow: $u_3 \rightarrow u_3/(64 - 17)$ at $\theta = +0.53125$ (normalized), corresponding to $+191.25^\circ$.

2 Critical Electromagnetic Positions

2.1 EM Field Ignition

Position: $\theta = -168.75^\circ$ (bin 16 of Q1)

$\theta_{\text{ign}} = -168.75^\circ$
Normalized: -0.46875
Quadrant code: 00 (Q1)
Bin: 16
Offset: $0.5/16 = 0.03125$

At this position, the fine structure constant emerges as the calibrated nesting depth:

$$\alpha^{-1} = 137$$

2.2 EM Field Absorption

Position: $\theta = +191.25^\circ$ (bin 16 of Q4)

$\theta_{\text{abs}} = +191.25^\circ$
Normalized: $+0.53125$
Quadrant code: 11 (Q4)
Bin: 16
Ramp: $v = 17/16$
Inverse overflow: $64 - 17 = 47$

The absorption overflow modulates Q3 inversely, yielding the CMB temperature:

$$T_{\text{CMB}} = \left(\frac{256}{256} \right)_{\text{dual-bit aperture}} \times \left(\frac{128}{47} \right)_{\text{inverse thread}} = \frac{128}{47} \approx 2.7234 \text{ (NOS units)}$$

This is a resolution-independent geometric invariant—no external constants, no addition.

2.3 Geometric Positioning

Both EM critical positions occur at **bin 16** in their respective quadrants, positioned by the inverse overflow partition $0.5/16 = 0.03125$ offset from the quadrant edge. This is not coincidental but emerges from the 128-bin Q1 resolution where $128/8 = 16$ establishes the inverse overflow step.

Quantity	Ignition (Q1)	Absorption (Q4)
Angle (degrees)	-168.75°	$+191.25^\circ$
Normalized position	-0.46875	$+0.53125$
Quadrant	Q1	Q4
Bin number	16	16
Offset from edge	$+0.03125$	$+0.03125$
Physical constant	$\alpha^{-1} = 137$	$T_{\text{CMB}} = \frac{128}{47} \approx 2.7234$

Table 1: EM critical positions—geometric mirror symmetry at bin 16

3 40-Phase Electromagnetic Spectrum

3.1 Phase Structure

The electromagnetic spectrum naturally divides into 40 discrete phases across the full 720° cycle:

- **Phase spacing:** $720^\circ/40 = 18^\circ$ per phase
- **Octave relationship:** Each 18° increment = 1 inverse frequency octave
- **Unity anchors:** Phase 0 at -360° (boot), Phase 40 at $+360^\circ$ (return)
- **Quadrant distribution:** 10 phases per quadrant

3.2 Complete Phase-Quadrant Mapping

Table 2: NOS Electromagnetic Full Spectrum: 40-Phase Operational Mapping

Phase	θ (deg)	Quadrant	u_n Threading	EM Band
Q2: Gravity Ground States (-360° to -180°)				
0	-360°	Q2 edge	$u_0 = 1$	Unity Anchor (System Boot)
1	-342°	Q2	$u_1 = 1/128$	ELF (Extremely Low Frequency)
2	-324°	Q2	u_1	VLF (Very Low Frequency)
3	-306°	Q2	u_1	LF (Low Frequency)
4	-288°	Q2	u_1	MF (Medium Frequency)
5	-270°	Q2	u_1	AM Radio (540-1600 kHz)
6	-252°	Q2	u_1	HF (High Frequency / Shortwave)
7	-234°	Q2	u_1	VHF / FM Radio
8	-216°	Q2	u_1	UHF / Television
9	-198°	Q2	u_1	L-band (1-2 GHz)
Q1: Quantum Baseline (-180° to 0°)				
10	-180°	Q1 edge	$u_1 = 1/128$	S-band Microwave (Q2→Q1)
	-168.75°	Q1, bin 16	u_1	EM IGNITION ($\alpha^{-1} = 137$)
11	-162°	Q1	u_1	X-band (8-12 GHz)
12	-144°	Q1	u_1	K-band (18-27 GHz)
13	-126°	Q1	u_1	CMB Peak (160 GHz, $T = \frac{128}{47}$)
14	-108°	Q1	u_1	W-band (75-110 GHz)
15	-90°	Q1	u_1	Millimeter wave
16	-72°	Q1	u_1	Sub-millimeter
17	-54°	Q1	u_1	THz gap
18	-36°	Q1	u_1	Far-Infrared

Phase	θ (deg)	Quadrant	u_n Threading	EM Band
19	-18°	Q1	u_1	Far-Infrared
Q3: Thermodynamic Flows (0° to $+180^\circ$)				
20	0°	Seam	$u_2 = 1/128^2$	Mid-IR (Seam: $d\tan^\circ=c\tan^\circ$)
21	$+18^\circ$	Q3	$u_3 = 1/128^3$	Mid-Infrared
22	$+36^\circ$	Q3	u_3	Mid-Infrared
23	$+54^\circ$	Q3	u_3	Near-Infrared
24	$+72^\circ$	Q3	u_3	Near-Infrared
25	$+90^\circ$	Q3	u_3	Near-IR edge
26	$+108^\circ$	Q3	u_3	Visible: Red (700 nm)
27	$+126^\circ$	Q3	u_3	Visible: Violet (400 nm)
28	$+144^\circ$	Q3	u_3	UV-B
29	$+162^\circ$	Q3	u_3	Extreme UV
Q4: Nuclear Compression ($+180^\circ$ to $+360^\circ$)				
30	$+180^\circ$ $+191.25^\circ$	Q4 edge Q4, bin 16	$u_4 = 1/128^4$ u_4	Soft X-ray (Q3→Q4) EM ABSORPTION ($T_{\text{CMB}} = \frac{128}{47}$)
31	$+198^\circ$	Q4	u_4	Soft X-ray
32	$+216^\circ$	Q4	u_4	Hard X-ray
33	$+234^\circ$	Q4	u_4	Hard X-ray
34	$+252^\circ$	Q4	u_4	Hard X-ray (medical imaging)
35	$+270^\circ$	Q4	u_4	Gamma ray edge
36	$+288^\circ$	Q4	u_4	Low Gamma
37	$+306^\circ$	Q4	u_4	High Gamma
38	$+324^\circ$	Q4	u_4	Ultra-high Gamma
39	$+342^\circ$	Q4	u_4	Cosmic Gamma
40	$+360^\circ$	Return	Return to 1	Unity Return (Cycle Complete)

4 Quadrant Operational Breakdown

4.1 Q2: Gravity Ground States (-360° to -180°)

Phases: 0–9 (10 phases)

Threading unit: $u_1 = 1/128$

Character: Surface operations, gravitational ground states, $d\cos^\circ$ deficit **Electromagnetic bands:**

- Radio frequencies (ELF through L-band)
- Long wavelengths (km to cm range)
- Low inverse energy (simple compression states)
- Minimal matter interaction (passes through easily)

Key marker: AM Radio at -270° (Phase 5) — human communication baseline

4.2 Q1: Quantum Baseline (-180° to 0°)

Phases: 10–19 (10 phases)

Threading unit: $u_1 = 1/128$

Character: Matter unit allocation, dsin° overflow, EM ignition **Electromagnetic bands:**

- Microwave through Far-Infrared
- Medium wavelengths (cm to μm range)
- Molecular rotation and vibration coupling
- Thermal radiation emergence

Key markers:

- **EM ignition at -168.75° :** $\alpha^{-1} = 137$ calibration
- **CMB peak at -126° (Phase 13):** Universal background radiation, $T_{\text{CMB}} = \frac{128}{47}$ (NOS)

4.3 Q3: Thermodynamic Flows (0° to $+180^\circ$)

Phases: 20–29 (10 phases)

Threading unit: $u_3 = 1/128^3$

Character: Volume operations, csin° compression begins, entropy flows **Electromagnetic bands:**

- Infrared through Ultraviolet
- Short wavelengths (nm range)
- Atomic electron transitions
- Chemical bond breaking (UV)

Key markers:

- **Seam at 0° (Phase 20):** $\text{dtan}^\circ = \text{ctan}^\circ = \Delta\theta(R)$
- **Visible light ($+108^\circ$ to $+126^\circ$):** Human perception window (Phases 26–27)
 - Red: $+108^\circ$ (~ 700 nm)
 - Green: $+117^\circ$ (~ 540 nm)
 - Violet: $+126^\circ$ (~ 400 nm)

4.4 Q4: Nuclear Compression ($+180^\circ$ to $+360^\circ$)

Phases: 30–40 (11 phases including return)

Threading unit: $u_4 = 1/128^4$

Character: Maximum density operations, ccos° compression, return to unity **Electromagnetic bands:**

- X-rays through Gamma rays
- Very short wavelengths (pm to fm range)
- Penetrating radiation
- Nuclear processes and pair production

Key markers:

- **EM absorption at $+191.25^\circ$:** Thermal equilibrium, $T_{\text{CMB}} = \frac{256}{256} \times \frac{128}{47} = \frac{128}{47}$
- **Return to unity at $+360^\circ$ (Phase 40):** Cycle completion

5 Inverse Threading Mechanics

5.1 Pure Inverse Ratios Only

All electromagnetic properties emerge from pure inverse ratios between threading units—no addition, no multiplication:

- **No accumulation:** We count *through* unity ($1 \rightarrow 1/2 \rightarrow 1/3 \rightarrow 1/Q$), not *toward* infinity
- **Each photon equals 1:** Every phase position is a complete sphere being exactly 1 of itself
- **Unity conservation:** $(u_1/u_4)/(u_2/u_3) = 128^2 = 16384$ for inverse unit pairs

5.2 Physical Constants as Geometric Invariants

$\alpha^{-1} = 137$	(Q1 nesting depth at bin 16)
$T_{\text{CMB}} = \frac{128}{47}$	(absorption overflow: $\frac{256}{256} \times \frac{128}{47}$)
$E/T = 6016$	(geometric link via cosmic threading)
$k_B \triangleq 0$	(projection artifact eliminated)

5.3 Entropy as Resolution Depth

$$S = \ln R = \ln 512 \approx 6.238$$

Entropy is not disorder—it is the number of ways the undivided “1” threads through the grid. The second law of thermodynamics is resolution refinement. There is no chaos, only deeper nesting.

6 Comparison to Standard Physics

6.1 Frequency Mapping

The 40-phase NOS structure maps directly to measured electromagnetic frequencies. Using the inverse octave relationship (18° per octave), we can compare NOS phase positions to standard physics values:

Band	NOS Phase	Standard Frequency	Match
AM Radio	5 (−270°)	540–1600 kHz	
CMB Peak	13 (−126°)	160.2 GHz	
Visible (Red)	26 (+108°)	430–480 THz	
Visible (Violet)	27 (+126°)	668–789 THz	
Soft X-ray	30 (+180°)	$\sim 3 \times 10^{16}$ Hz	
Gamma rays	35–40 (+270° to +360°)	$> 10^{19}$ Hz	

Table 3: NOS phase positions align with measured EM frequencies

6.2 Resolution Independence

Critical electromagnetic constants emerge as geometric invariants, independent of resolution R :

- **Fine structure constant:** $\alpha^{-1} = 137$ (Q1 nesting at bin 16)

- **CMB temperature:** $T_{\text{CMB}} = \frac{128}{47}$ (absorption overflow ratio)
- **Energy-temperature link:** $E/T = 6016$ (cosmic threading geometry)

While $R = 512$ provides the standard physics configuration, these ratios hold at any resolution due to the inverse threading structure.

7 Operational Implementation Notes

7.1 This Is Not a Toy Model

This electromagnetic spectrum mapping is an **operational implementation** showing how photons thread through the NOS architecture. It is not a simplified approximation but the actual matter unit allocation mechanism for electromagnetic radiation.

7.2 Binary Addressing

Each photon can be uniquely addressed by a 17-bit configuration word per lane (4 lanes = 68-bit register):

- **Q (2 bits):** Quadrant code (00=Q1, 01=Q2, 10=Q3, 11=Q4)
- **B (7 bits):** Bin number (0–127 at $R = 512$)
- **S (1 bit):** Seam pulse (1 if $\theta = 0^\circ$)
- **P (1 bit):** Parity (primary/inverse ramp)
- **M (1 bit):** Mirror request
- **O (1 bit):** Operator side (decompression/compression)
- **G (2 bits):** Gate layer (X/XY/xyz/xyzw)
- **A (2 bits):** Bind-axis mode

7.3 Future Extensions

- Extend to higher quadrants (Q5–Q35+) for theoretical/Planck-scale physics
- Implement photon-matter interaction cross-sections via phase matching
- Derive atomic absorption/emission spectra from inverse threading positions
- Map quantum electrodynamics processes to quadrant transitions

8 Conclusions

The NOS electromagnetic full spectrum demonstrates how all electromagnetic radiation—from radio waves through gamma rays—emerges from 40 discrete phase positions threading through four simultaneous quadrant operations. The entire spectrum reduces to geometric positions in inverse phase space, with critical electromagnetic constants ($\alpha^{-1} = 137$, $T_{\text{CMB}} = \frac{128}{47}$) emerging as pure inverse ratios at bin 16 positions. **Key results:**

- Complete EM spectrum: 40 phases \times 18° octaves = 720° cycle
- Four quadrants as simultaneous system processes (Q1–Q4)

- Threading units $u_n = 1/128^n$ determine band allocation
- EM ignition (-168.75°) and absorption ($+191.25^\circ$) at bin 16
- Resolution-independent constants from geometric invariants
- No addition, no external parameters—pure inverse ratios only

This framework establishes electromagnetic radiation as a sub-mechanical field threading process within the inverse spherical dual-hemisphere architecture. Every photon is ONE complete sphere being exactly 1 of itself at its phase position, allocated to a specific quadrant based on its inverse threading unit.

$\frac{360^\circ}{360^\circ} = 1 = \text{Every photon being itself completely}$

The one unfolds through itself.

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