Multi–Plane Field Syntergic Theory Mapped to Quantum Field Theory

(Working Notes)

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Abstract

Multi–Plane Field Syntergic Theory (MPFST) posits that the familiar Einstein–Maxwell–Schr"odinger (EMS) sector of physics arises as a dimensional reduction of an 11–dimensional tri–plane lattice action defined on three mutually orthogonal bundles: Stage (Ω_{0-3}), Occupant (Ω_{4-8}) and Mask/Source (Ω_{9-11}).This document constructs an explicit dictionary between MPFST and standard quantum field theory (QFT), including the Standard Model as an effective Stage–sector theory. We summarise the master action, derive the 4D EMS sector, and interpret quantisation, gauge fields, matter, and decoherence in the MPFST language. We then incorporate MPFST's coherence gating and avalanche mechanism, which have been tested in a cross–domain toolkit spanning physics, chemistry and biology, and in a recent analysis of successive Rindler spacetimes and EEG band dynamics.The goal is not a full derivation of the Standard Model from MPFST, which remains open, but a coherent map: how QFT objects (fields, propagators, renormalisation, measurement) are reinterpreted as effective limits of the MPFST lattice and its projection functional.

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1 Motivation and Overview

Quantum field theory (QFT) provides the standard description of particle physics and quantum matter: a Lagrangian density on a 4D spacetime, with fields quantised via canonical or path–integral rules. The Standard Model (SM) couples non–Abelian gauge fields and matter spinors on a classical metric background. General relativity (GR) describes the metric itself as dynamical.

MPFST proposes that:

- All of these "classical pillars" — relativity, quantum mechanics, thermodynamics, electromagnetism, strong–field gravity — are complementary limits of a single 11D lattice action.
- The lattice carries three types of planes: Stage (ordinary 3+1D spacetime), Occupant (field carriers, including neuro/biological bands), and Mask/Source (fractional memory, vantage, coherence phase).
- A dimensionless coherence score $m_\ell \in [0, 1]$, derived from heavy–tail, $1/f^\gamma$ and Hurst exponents (μ, γ, H) of time series, controls a two–tier gate with thresholds $m_1 \approx 0.33$ and $m_2 \approx 0.66$. Above these gates, avalanches, slips and locks appear across domains.

From a QFT perspective, MPFST offers:

1. A geometric origin for the U(1) gauge potential: the phase of a higher–plane scalar Ψ whose kinetic term and one–loop corrections generate the Maxwell action.
2. A block–diagonal 11D metric whose 4D part yields Einstein gravity, with an additional conserved stress from the compatibility tensor C_{ABCD}.
3. A projection functional $P[\Psi, u, h]$ that realises decoherence and "measurement" as a coherence–gated, fractional–memory process rather than an ad hoc collapse postulate.
4. An avalanche/gating toolkit that reproduces slip–lock dynamics and spectral shell jumps in quantum detectors (successive Rindler data), condensed matter, chemistry, and physiology.

The rest of this document builds an explicit dictionary between this structure and standard QFT, including a proposed embedding of the SM as an effective Stage–sector theory.

2 Synopsis of MPFST

2.1 Tri–plane geometry

MPFST starts from an 11D bundle

$$B = \Omega_{0-3} \times \Omega_{4-8} \times \Omega_{9-11}, \tag{1}$$

with local coordinates

$$x^A = (x^\mu, \chi^i, \zeta^{\hat{a}}), \qquad \mu = 0, \ldots, 3, ; i = 4, \ldots, 8, ; \hat{a} = 9, 10, 11. \tag{2}$$

The metric $\Lambda_{AB}(x)$ is block–diagonal when the *compatibility tensor* vanishes,

$$C_{ABCD} := \nabla_{[A}\Lambda_{B]C} - \sigma^E_{\ [A}\nabla_E\Lambda_{B]C}; , \tag{3}$$

yielding

$$\Lambda_{AB} = \mathrm{diag}(g_{\mu\nu}, \sigma_{ij}, \rho_{\hat{a}\hat{b}}). \tag{4}$$

Residual nonzero C_{ABCD} acts as a mixing stress that appears in the effective 4D Einstein equations.

2.2 Field content and planes

The basic dynamical fields are:

- The 11D metric Λ_{AB} and the compatibility tensor C_{ABCD}.
- A real quintet u_p on Ω_{4-8}, $p = 4, \ldots, 8$, the "Occupant" band.
- A complex scalar $\Psi = \rho e^{i\theta}$ whose phase generates the U(1) gauge sector.
- An entropic back-wash scalar h on the Mask/Source planes, with a fractional Laplacian.
- Additional Mask/Source fields d (illusions–doping), v (vantage–doping) and ζ (coherence/gauge phase), which appear in the six–PDE lattice block and control gating.

Plane by plane, the field content is organised as (schematically)

Planes	Fields
Ω_{0-3}	$g_{\mu\nu}$, A_μ, Schr"odinger field θ Ω_{4-8}
Occupant u_p Ω_9	d, h (illusions and entropy) Ω_{10}
v (vantage) Ω_{11}	ζ, high coherence phase φ

Energy and information flow from Mask/Source down to Stage via the couplings of Ψ and the gate functional; cosmological "dark energy" and biological/global coherence appear as different scales of the same projection mechanism.

2.3 Master action

The compact 11D action is

$$S[\Lambda, u, \Psi, h] = \int_{M_{11}} d^{11}X \sqrt{|\Lambda|}\, \mathcal{L}_{11}, \tag{5}$$

$$\begin{aligned} \mathcal{L}_{11} = {} & \frac{1}{2\kappa_{11}} R(\Lambda) - \frac{1}{4} C_{ABCD} C^{ABCD} \\ & + \sum_{p=4}^{8} \left(\nabla_A u_p \nabla^A u_p + m_p^2 u_p^2 \right) - \frac{1}{2}\, \Xi^{AB} \partial_A \Psi_i\, \partial_B \Psi^i \\ & - V(\Psi) - \frac{1}{2} h K_\alpha h + \lambda\, P[\Psi, u, h]. \end{aligned} \tag{6}$$

where:

- $R(\Lambda)$ is the 11D Ricci scalar.
- Ξ^{AB} is a positive form aligned with Λ^{AB}.
- $V(\Psi)$ is a quartic–sextic potential, renormalized in a standard EFT way with couplings $(g_4, \tilde{g}_6)$ running at scale μ.
- $K_\alpha = \lambda_h (-\Delta)^{\alpha/2}$ with $1 < \alpha \leq 2$ implements fractional memory on Plane 9.
- $P[\Psi, u, h]$ is the projection/gating functional controlled by the coherence score m_ℓ and thresholds (m_1, m_2).

Dimensional reduction, zero–mode truncation on $\Omega_{4-8} \times \Omega_{9-11}$, and the gate projection produce a 4D effective EMS sector plus a six–field PDE lattice on a 3D spatial grid.

3 Baseline: Quantum Field Theory and the Standard Model

For comparison, recall the standard QFT picture on a 4D manifold $(M_4, g_{\mu\nu})$:

- Fields (schematically): gauge fields A_μ^a for $G_{\rm SM} = SU(3) \times SU(2) \times U(1)$, Dirac spinors ψ_f for matter, and a scalar Higgs doublet H.
- Lagrangian:

$$\mathcal{L}\mathrm{SM} = -\frac{1}{4} F^a \mu\nu F^{a,\mu\nu} + \bar{\psi}(i\gamma^\mu D_\mu - m)\psi + |D_\mu H|^2 - V(H) + \mathcal{L}\mathrm{Yukawa}. \tag{7}$$

- Gravity: classically added via the Einstein–Hilbert action

$$S\mathrm{EH} = \frac{1}{16\pi G} \int d^4x \sqrt{-g}, R[g_{\mu\nu}], \tag{8}$$

  coupled minimally to the matter stress tensor $T_{\mu\nu}$.

Quantisation proceeds via canonical commutators or the path integral:

$$Z[J] = \int \mathcal{D}\Phi; \exp\left(iS[\Phi] + i \int d^4x, J \cdot \Phi \right), \tag{9}$$

with renormalisation determining running couplings and effective field theories at different scales.

The central question for MPFST is: how do these familiar ingredients arise from the 11D lattice and what, if anything, replaces or supplements the usual measurement/postulate structure?

4 From MPFST to 4D EMS and QFT

4.1 Dimensional reduction and Einstein sector

Varying (5) with respect to Λ^{AB} yields

$$G_{AB} = \kappa_{11} T^{(\mathrm{tot})} AB, \tag{10}$$

with $T^{(\mathrm{tot})} AB$ the sum of the C–sector, Occupant, Ψ and h stresses. After internal volume integration and zero–mode truncation one finds

$$G_{\mu\nu} = 8\pi G_4 \left(T^{(u)} \mu\nu + T^{(\mathrm{EM})} \mu\nu + T^{(h)} \mu\nu + T^{(\mathrm{eff})} \mu\nu(C) \right), \qquad 8\pi G_4 = \frac{\kappa_{11}}{V_8}, \tag{11}$$

where V_8 is the internal volume, and

$$T^{(\mathrm{eff})} \mu\nu(C) = V_8 \left[\frac{1}{2} g\mu\nu \langle C_{ABCD} C^{ABCD} \rangle_{I\times H} - 2 \langle C_{\mu ABC} C_{\nu}{}^{ABC} \rangle_{I\times H} \right] \equiv \sigma_C(m_\ell) g_{\mu\nu} + \pi^{(C)}_{\mu\nu} \tag{12}$$

is a small, conserved stress determined by the compatibility tensor and modulated by coherence.

In the *gate–closed* regime $m_\ell < m_1$, $C_{ABCD} \approx 0$ and MPFST reduces to ordinary GR+EM+Klein–Gordon with small coloured noise — exactly the regime in which SM QFT on curved spacetime lives.

4.2 U(1) gauge sector from the phase of Ψ

Write $\Psi = \rho e^{i\theta}$ and define a 4D gauge potential as

$$A_\mu := \frac{1}{q} \partial_\mu \theta, \tag{13}$$

with a St"uckelberg shift symmetry $\theta \to \theta + q\chi$, $A_\mu \to A_\mu + \partial_\mu \chi$. The kinetic term for Ψ is

$$-\frac{1}{2} \Xi^{AB} \partial_A \Psi, \partial_B \Psi^* = -\frac{1}{2} \Xi^{AB} \left(\partial_A \rho \partial_B \rho + \rho^2 \partial_A \theta \partial_B \theta \right). \tag{14}$$

After internal truncation and integrating heavy modes of ρ and internal components of A_A, one obtains an effective 4D action

$$S_{\mathrm{EM}} = \int d^4x \sqrt{-g} \left[-\frac{Z_A}{4} F_{\mu\nu} F^{\mu\nu} - \frac{1}{2} m_A^2(x) A_\mu A^\mu + J^\mu A_\mu \right], \qquad F_{\mu\nu} := \partial_\mu A_\nu - \partial_\nu A_\mu, \tag{15}$$

with Z_A and $m_A(x)$ determined by V_8, ρ_0 and the running couplings of $V(\Psi)$, and J^μ the covariant phase current.

In the low–mass limit $m_A^2 \ll$ experimental resolution, the Proca term is negligible and we recover Maxwell's equations:

$$\nabla_\mu F^{\mu\nu} = J^\nu, \qquad T^{(\mathrm{EM})} \mu\nu = Z_A \left(F\mu\rho F_\nu{}^\rho - \frac{1}{4} g_{\mu\nu} F_{\rho\sigma} F^{\rho\sigma} \right). \tag{16}$$

Thus in MPFST, the Stage U(1) gauge field of QFT is the gradient of the phase of a higher–plane scalar, with its kinetic term generated by integrating out internal modes — a Kaluza–Klein/St"uckelberg type mechanism.

4.3 Schr"odinger limit and matter fields

In the weak–field, slow–metric limit, the phase sector of Ψ reduces to a Schr"odinger equation for a coarse–grained wavefunction on Stage, with an additional decoherence gate driven by the projection functional $P[\Psi, u, h]$.Schematically, one finds an effective dynamics

$$i\hbar\partial_t\psi = \left(-\frac{\hbar^2\nabla^2}{2m} + V_{\text{eff}}[g_{\mu\nu}, A_\mu, u, h]\right)\psi \tag{17}$$

with a coherence–dependent damping of off–diagonal density matrix terms, controlled by $\lambda\Delta m_\ell$. This appears explicitly in the MPFST treatment of the double–slit experiment, where the coherence factor for the interference term is

$$\Gamma(t) = \exp\left[-\frac{(\lambda\Delta m_\ell)^2}{1+\alpha}\left(\frac{t}{t_c}\right)^3\right], \tag{18}$$

with $t_c = \hbar/E_{\text{slit}}$ and Δm_ℓ the coherence jump associated with detector activation.

From the QFT standpoint, MPFST leaves the local Schr"odinger or Dirac dynamics untouched at low m_ℓ, but replaces the collapse postulate with a dynamical, coherence–gated decoherence kernel.

4.4 Quantisation in MPFST

MPFST is formulated as a classical field theory in 11D. The working view is:

- Quantisation of Stage fields proceeds in the usual way, treating the reduced 4D EMS action plus matter as an effective QFT, with MPFST providing constraints on couplings and renormalisation flow via the higher–plane structure.
- The projection functional $P[\Psi, u, h]$ and fractional operator K_α encode nonlocal memory and coherence, giving rise to avalanche behaviour of measurement outcomes. These are not ordinary SM degrees of freedom, but background fields whose statistics are constrained by cross–domain datasets.

In particular, the EFT renormalisation of $V(\Psi)$ in 4D follows standard one–loop β–functions for quartic and sextic couplings (with the sextic irrelevant at low energy), and the gate threshold $m_{\ell,c}$ is determined by the ratio of quartic to sextic amplitudes at the OMV bandwidth.

5 MPFST–QFT Dictionary

We now assemble a field–by–field map, organised by planes.

5.1 Stage plane: GR+QFT on curved spacetime

- **Metric** $g_{\mu\nu}$:
  - In QFT on curved spacetime: classical background or dynamical via GR.
  - In MPFST: $g_{\mu\nu}$ is the Stage block of Λ_{AB}; linearised perturbations $h_{\mu\nu}$ are spin–2 lattice phonons whose propagator reduces to the GR graviton in the gate–closed limit.
- **U(1) gauge field** A_μ:

- In QFT: fundamental gauge field; part of G_{SM}.
- In MPFST: the gradient of θ, the phase of Ψ, with kinetic term and normalisation generated by internal modes. Non–Abelian generalisations are expected from isometries of the internal blocks and multi–phase generalisations of Ψ, but are not yet fully constructed.

- **Matter fields**:
  - In QFT: spinors and scalars carrying charges under G_{SM}.
  - In MPFST: Stage matter is treated as usual QFT fields living on $g_{\mu\nu}$ and A_μ, but its masses and couplings can depend on occupant and Mask/Source fields (e.g. environmental dependence of effective masses, decoherence rates). Full derivation of Dirac fields and SM Yukawas from the 11D lattice is an open problem.

- **Vacuum energy**:
  - In QFT: zero–point energy leads to a cosmological constant problem.
  - In MPFST: the isotropic part of $T^{(\mathrm{eff})}\mu\nu(C)$ acts as a small vacuum–like density, set by internal geometry and gate state, offering a nonperturbative route to the observed $\Omega\Lambda$.

5.2 Occupant plane: coarse–grained fields and band structure

The real quintet u_p on Ω_{4-8} obeys coupled wave equations with damping and mask–modulated couplings, e.g. in the lattice simulator:

$$\partial_t^2 u_p = c_p^2 \nabla^2 u_p - \gamma_p u_p + \sum_{q \neq p} (\omega_0 + \eta_\omega W_{pq}) u_q + \mu_{p9} d + \text{noise}, \tag{19}$$

with W_{pq} a sparse adjacency mask built from Flower–of–Life, Kabbalistic Tree, and Russell spiral templates.

In the QFT mapping:

- u_p are not elementary SM fields, but coarse–grained order parameters or collective modes that project onto Stage observables, notably EEG bands and other bio/EM rhythms.
- Public EEG data show that the canonical $\delta, \theta, \alpha, \beta, \gamma$ bands map 1:1 onto five latent factors that behave like projected Occupant fields, with state–space fits, spectral shell jumps, and phase–flip asymmetries matching the MPFST adjacency graph better than null graphs.
- In a more speculative extension, internal indices p could also label families of QFT sectors (e.g. confining vs non–confining gauge fields, flavour hierarchies) via their different coupling to Mask/Source planes.

5.3 Mask/Source planes: fractional memory and coherence gating

On Ω_{9-11}, the fields d, h, v, ζ implement fractional memory and coherence dynamics:

- h: obeys a fractional diffusion equation with $K_\alpha = \lambda_h(-\Delta)^{\alpha/2}$, realising long–range memory in time series (heavy tails, $1/f^\gamma$, Hurst exponent H).
- d: a sabotage/illusions field that injects structured noise into Occupant dynamics, responsible for flicker and intermittency.

- v: a vantage field that collects Occupant activity into a direction vector; this appears in cosmological signatures and in cross–system synchronisation (brain–heart–gut).
- ζ, φ: coherence phases on Plane 11 that couple to ϕ (gauge phase) and modulate gauge noise and decoherence.

The gate functional $P[\Psi, u, h]$ uses the empirical coherence score $m_\ell(\mu, \gamma, H)$ to modulate couplings and damping via two thresholds $m_1 \approx 0.33$ (slip regime) and $m_2 \approx 0.66$ (lock regime).In QFT language, the Mask/Source planes supply:

- Non–Markovian kernels for effective propagators (fractional powers of $\Box$).
- Stochastic, coherence–dependent modifications to effective actions that reproduce avalanche statistics in detectors and materials.
- A dynamical, environmental model of decoherence and measurement, superseding the ad hoc collapse postulate.

5.4 Standard Model embedding (proposed)

A full derivation of the SM gauge group and spectrum from MPFST is not yet available. However, a plausible embedding is:

- The Stage block carries a conventional G_{SM} gauge bundle, with the Abelian factors explicitly derived from Ψ and the non–Abelian ones associated with isometries or harmonic forms on $\Omega_{4-8} \times \Omega_{9-11}$ (as in Kaluza–Klein theories).
- Matter spinors live on Stage as usual; their masses and Yukawa couplings depend on expectation values of Occupant and Mask/Source fields, offering a route to flavour and mass hierarchies.
- The Higgs sector can be reinterpreted as an effective low–energy mode of Ψ and/or Occupant condensates; the quartic and sextic couplings of $V(\Psi)$ already have a renormalisation structure compatible with EFT.

At present, this should be viewed as a programme: MPFST provides structure and constraints, not yet a uniqueness proof for the SM.

6 Avalanche Dynamics and the Measurement Problem

6.1 Coherence meter and gates

The MPFST toolkit constructs a coherence score m_ℓ from three scale–free exponents of a time series:

- μ — heavy–tail exponent of dwell/burst distributions (Clauset–Shalizi–Newman estimator).
- γ — aperiodic $1/f^\gamma$ spectral slope of the PSD.
- H — DFA–2 Hurst exponent of the signal or its envelope.

These are combined into a normalised $m_\ell \in [0,1]$, with fixed gates

$$m_1 \approx 0.33 \quad \text{(slip)}, \qquad m_2 \approx 0.66 \quad \text{(lock)}. \tag{20}$$

A Spectral Shell Monitor (SSM) tracks energy in log–spaced spectral shells and detects intra–shell slips and inter–shell jumps.

In the QFT context, m_ℓ and SSM apply to detector click trains, field fluctuations, and vacuum noise.

6.2 Successive Rindler spacetimes

The analysis of detector "click trains" in successive Rindler spacetimes provides a direct quantum–field test of MPFST gating:

- The Rindler–Rindler observer's detector shows a steeper $1/f$ PSD (increase $\Delta\gamma \approx +0.2$), heavier tails in dwell–time distributions (drop in μ from ~ 2.3 to ~ 1.8), and higher Hurst exponent ($H \approx 0.7$ vs 0.5), precisely the pattern expected when crossing from $m_\ell < m_1$ to $m_\ell > m_2$.
- SSM analysis reveals a high–frequency slip followed by a low–frequency jump as the detector transitions from slip to locked Planckian response. These events vanish under time/frequency–scrambled nulls.
- The transition probability versus proper time shows a clear two–tier behaviour: a bursty, irregular precursor phase (slip) and a steady Planckian plateau (lock).

These results validate that the MPFST coherence gate can be realised in a purely QFT setting, without invoking consciousness or biology, and that measurement–like outcomes (stable detector response) emerge at $m_\ell \gtrsim m_2$.

6.3 Cross–domain avalanche validations

The same toolkit and gating rules have been applied to diverse systems: quantum devices, superconductors, plasmas, catalysis, water anomalies, batteries, EEG, HRV, and gut rhythms.Patterns consistently observed:

- Slips cluster at $m_\ell \geq m_1$; locks and state transitions at $m_\ell \geq m_2$.
- Driver–to–system causality rises only at/above m_2.
- SSM events align with the correct spectral shells and vanish under nulls (time/shuffle, phase randomisation, graph rewirings).

From a QFT viewpoint, this suggests that avalanche–type phenomena in measurement, condensed matter and across scales share a common coherence gating, with MPFST providing the background fractional field (h) that accumulates memory and triggers slips and locks.

6.4 Double–slit and decoherence

As noted above, MPFST reproduces electron double–slit behaviour by adding fractional phase noise from the projection functional.The interference term decays when $\lambda \Delta m_\ell \gtrsim 10^{-8}$, matching threshold behaviour in which–way experiments. In QFT language, the environment (Mask/Source planes) generates an effective nonlocal influence functional that selectively damps off–diagonals when coherence spikes.

Thus, "collapse" in MPFST is not fundamental but an emergent, avalanche–like transition when m_ℓ crosses m_2 in the coupled field–detector system.

7 EEG Bands, Occupant Fields and QFT on Stage

The extensive EEG analysis under MPFST is an instructive example of mapping between Occupant and Stage:

- Canonical EEG bands $\delta, \theta, \alpha, \beta, \gamma$ behave like projections of the five Occupant fields $u_4, \ldots, u_8$:
  - A constrained state–space model with five latent factors and an observation matrix constrained to a permuted diagonal (each latent $\rightarrow$ one band, monotone) fits the data significantly better than null or inverted hypotheses.
  - SSM–detected octave jumps in spectral shells coincide with band–specific power changes (e.g. $\delta \rightarrow \theta$), and disappear when shell labels are scrambled.
  - Phase–flip asymmetries between band pairs follow the MPFST adjacency graph (e.g. Kabbalistic Tree), but vanish under degree–preserving graph shuffles.
- The same $(\mu, \gamma, H) \rightarrow m_\ell$ mapping organises slips and locks in EEG, and the gate m_2 marks when stimulus–to–EEG directionality becomes strong (entrainment).

This is QFT–adjacent rather than QFT itself, but demonstrates how coarse QFT observables (band powers) can be reinterpreted as Stage projections of Occupant fields, with Mask/Source planes shaping their dynamics. The same logic can, in principle, be applied to other field theories (plasma fluctuations, superconducting phases, etc.).

8 Implications and Open Questions for QFT

8.1 What MPFST adds to QFT

Summarising the dictionary:

- **Geometric origin of gauge fields**: U(1) arises from a higher–plane scalar phase; non–Abelian groups may arise from internal geometry. This ties gauge symmetry more tightly to spacetime/plane structure.
- **Vacuum energy and dark sector**: The compatibility tensor stress $T^{(C)}\mu\nu$ provides a conserved, coherence–dependent vacuum–like component, fixed by internal geometry and the gate, potentially alleviating the cosmological constant problem.
- **Decoherence and measurement**: Projection is encoded in a specific fractional–memory/gate structure that has passed nontrivial tests in successive Rindler QFT data, rather than being postulated.
- **Cross–domain universality**: The same $m\ell$ and SSM logic applies from quantum detectors to chemistry and biology, suggesting a universal "coherence budget" underlying QFT and classical emergent processes.

8.2 Open problems

Key open questions include:

- **Full SM derivation**: Deriving $SU(3) \times SU(2) \times U(1)$, chiral spinors and Yukawa couplings from internal plane symmetries and lattice structure remains future work.

- **High–coherence regime**: The six–PDE lattice becomes stiff as $m_\ell \to 1$; robust numerical schemes and analytic approximations in this regime are still under development.
- **Quantum information formulation**: Recasting the projection P_{0-3} as a CPTP map on qubits and relating m_ℓ to entanglement measures would strengthen the bridge to quantum information theory.
- **Early universe and CMB**: The vantage field explanation for the CMB dipole and higher multipole anomalies is only sketched; full Boltzmann codes with MPFST corrections are needed.

8.3 Exotic propulsion and constraints

Proposals like the "Field Resonance Propulsion Concept" envisage manipulating fields to produce thrust without reaction mass. In the MPFST mapping:

- Stage–sector stress–energy remains locally conserved as in GR, with $T_{\mu\nu}^{(\mathrm{tot})}$ including the C–sector. There is no obvious route to reactionless propulsion without exotic boundary conditions.
- Coherence gating can, in principle, modulate effective inertial and dissipative properties of materials or fields, but any thrust must still be balanced by corresponding momentum flows in the full 11D stress tensor.

Thus MPFST is compatible with investigating subtle field–matter couplings (e.g. in OMV experiments), but does not trivially endorse strong claims of propellantless drives.

9 Conclusion

We have constructed a working map between MPFST and QFT:

- The 11D MPFST action reduces to a 4D EMS sector identical to GR+Maxwell+Schr"odinger in the gate–closed regime, providing the classical background for SM QFT.
- Gauge fields, vacuum energy, and decoherence have concrete geometric and fractional–memory avatars in the tri–plane lattice.
- A coherence gate and avalanche mechanism, tested via a dedicated toolkit and applied to successive Rindler data, superconductors, plasmas, catalysis, EEG, HRV and more, offers a unified view of how QFT amplitudes turn into definite outcomes.

The Standard Model embedding is incomplete but constrained; future work will aim to derive non–Abelian sectors, spinor structure and flavour hierarchies directly from internal plane geometry and lattice adjacency. In the meantime, MPFST can be treated as a structured, testable extension of QFT's background: a way to talk quantitatively about coherence, measurement, and cross–domain universality without abandoning the successful local field description of particles and interactions.