Individual Bioelectromagnetic Profiles and Immune Coherence Field Dynamics

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Abstract

The warfare metaphor that has dominated immunology for over a century is increasingly challenged by empirical anomalies, chief among them the non-specific effects (NSEs) of live vaccines, which reduce all-cause mortality far beyond their target pathogens. A coherence-field model of immunity — grounded in the 19-Layer Quaternion Vacuum Model (19LQVM) and the Free Energy Principle — provides a more adequate theoretical framework: health is multi-scale phase synchronization; disease is attractor drift or false-attractor entrapment. This paper extends that model by introducing the **Constitutive Bioelectromagnetic Profile (CBP)** as the individual's characteristic electromagnetic field structure, encoding a stable attractor topology that determines baseline immune coherence dynamics. Drawing on Maxwell's field equations as the physical foundation, we propose that the CBP determines the individual's spectral coupling architecture, preferred attractor landscape, and immunological trajectory. Specifically, we argue that (1) the autonomic immune surveillance network functions as a real-time coherence monitor operating through visceral interoceptive fields; (2) the individual's characteristic free-energy minimization protocol defines low-action immunological trajectories; (3) stable spectral

couplings in the immune network graph correspond to constitutively active electromagnetic pathways; and (4) chronic exogenous electromagnetic entrainment — prolonged exposure to hetero-field environments — constitutes false-attractor induction with measurable immunological consequences. This framework offers a principled basis for individualized coherence medicine and a novel theoretical context for interpreting non-specific vaccine effects across electromagnetically distinct individuals.

Keywords: bioelectromagnetic profile, immune coherence, 19LQVM, Free Energy Principle, active inference, attractor landscape, non-specific vaccine effects, Maxwell field theory, electromagnetic entrainment, PEMF, SCENAR

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1. Introduction

The dominant metaphor of immunology is warfare. Since Metchnikoff's discovery of phagocytosis in the 1880s, Western immunology has framed the body's protective apparatus as an army — trained soldiers (lymphocytes), target recognition (antigens), memory (immune priming), and command structures (cytokine signaling). This metaphor has been enormously productive, organizing a century of vaccine development and therapeutic strategy. Yet it is structurally blind to a growing class of empirical anomalies.

The most significant of these is the non-specific effect (NSE) of vaccines. Live-attenuated vaccines — BCG, measles, oral polio — reduce all-cause mortality in high-infant-mortality populations by 30–50%, far exceeding deaths attributable to their target pathogens [Aaby & Benn, 2019; Higgins et al., 2016]. Conversely, some non-live vaccines (DTP) have been

associated with temporary increases in all-cause mortality in specific subgroups [Benn et al., 2013]. Within the warfare model, these effects are inexplicable anomalies. Within a coherence-field model, they are mathematically expected consequences of perturbing a coupled, multi-scale resonance field.

A companion paper establishes the formal seven-layer architecture of this coherence model, grounded in the 19LQVM and integrating stochastic field dynamics, Fokker-Planck probability flow, reaction-diffusion spatial coherence, graph Laplacian network dynamics, active inference (Free Energy Principle), renormalization group scale invariance, and path-integral trajectory analysis [Konstapel, 2026]. The present paper extends that architecture in a crucial dimension: **individual variation**.

Why does the same pathogen produce mild illness in one person and severe systemic collapse in another? The warfare model answers with genetics, microbiome, and prior exposure — valid but insufficient. We propose an additional foundational layer: the **Constitutive Bioelectromagnetic Profile (CBP)** — the individual's characteristic, relatively stable electromagnetic field structure — and its role in structuring immune attractor topology.

The CBP is a physical proposal, not a metaphysical one. Maxwell's equations govern the dynamics of electromagnetic fields in biological tissue at every scale. Living organisms are not merely biochemical machines; they are electromagnetic field structures whose spatial and spectral properties are therapeutically relevant, as demonstrated by biophoton emission research [Popp, 1992], PEMF therapy [Markov, 2007], and Soviet-era biofield research embodied in SCENAR technology [Gorfinkel & Zucker, 2005]. The CBP encodes the individual's characteristic spectral coupling architecture — the set of stable resonance

couplings, preferred attractors, and coherence regimes that constitute the individual's electromagnetic baseline.

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2. Theoretical Background

2.1 Maxwell's Field Equations as the Physical Foundation

The organizing principle of the coherence-field model is that biological systems at every scale maintain themselves as structured electromagnetic fields governed by Maxwell's equations:

$$\nabla \cdot \mathbf{E} = \frac{\rho}{\varepsilon_0}, \quad \nabla \cdot \mathbf{B} = 0$$

$$\nabla \times \mathbf{E} = -\frac{\partial \mathbf{B}}{\partial t}, \quad \nabla \times \mathbf{B} = \mu_0 \mathbf{J} + \mu_0 \varepsilon_0 \frac{\partial \mathbf{E}}{\partial t}$$

In biological tissue, the current density **J** includes not only ionic conduction but bioelectrical oscillatory currents arising from cellular membrane dynamics, neural field activity, cardiac electromagnetic emission, and intracellular microtubule oscillations [Hameroff & Penrose, 2014]. The resulting field structure is not uniform across individuals — it reflects the specific geometry of the organism's electrochemical architecture, established during development and maintained throughout life.

Phase coherence between oscillatory components of this field determines the organism's ability to integrate information across scales and maintain coordinated response to perturbation. Health, in electromagnetic terms, is the maintenance of stable phase relationships across the multi-scale field structure. Disease is phase decoherence — the disruption of these relationships beyond the organism's restoring capacity.

2.2 The Coherence-Field Model of Immunity

In the 19LQVM framework, biological systems at every scale are organized as multi-scale resonance fields governed by four mechanisms: rotational periodicity, helical progression, nilpotent convergence, and resonant phase-locking [Konstapel, 2024a]. Stability emerges not from the destruction of perturbations but from their absorption into coherent phase relationships.

Applied to the immune system, the organism is a **coherence manifold**: a dynamically maintained multi-scale phase structure. The immune system is the apparatus that detects deviations from this structure, integrates perturbations, and restores phase coherence. Health is the dominance of low-action trajectories in the path-integral sense. Disease is either coherence rupture or false-attractor entrapment.

The seven formal layers of this model:

1. **Stochastic field dynamics**: The immune state evolves with functional randomness, enabling phase-space exploration and return to coherent states.
2. **Fokker-Planck probability flow**: Health is concentration of probability mass around stable attractors (low entropy). Chronic disease is a false attractor.

3. **Reaction-diffusion spatial coherence**: Inflammation is a gradient instability; resolution is restoration of spatial homogeneity.
4. **Graph Laplacian network dynamics**: Immune components form a weighted dynamic graph. The spectral gap measures resilience. High spectral gap = rapid return to coherence after perturbation.
5. **Active inference (Free Energy Principle)**: The immune system maintains a generative model of its molecular environment and minimizes mismatch between predicted and observed states. Autoimmunity is a false prior.
6. **Renormalization group scale invariance**: The same coherence logic applies from molecular to organismal scales.
7. **Path-integral trajectory analysis**: Health is dominance of low-action trajectories. Chronic inflammation is a trapped trajectory.

2.3 The Constitutive Bioelectromagnetic Profile

We define the **Constitutive Bioelectromagnetic Profile (CBP)** as the individual's characteristic, relatively stable electromagnetic field structure, spanning from quantum coherence of intracellular microtubules through cellular oscillatory coupling, tissue-level electromagnetic gradients, and whole-body bioelectromagnetic emission. The CBP is not static — it responds to environment, nutrition, stress, and relationship. But it has a characteristic baseline topology: a set of preferred attractors, stable spectral couplings, and coherence regimes established early in development and maintained throughout life.

This is empirically grounded. McCraty et al. [2009] documented stable individual differences in cardiac electromagnetic field structure with inter-individual entrainment effects. Popp [1992] demonstrated coherent biophoton emission as an individual-characteristic biological parameter. SCENAR and PEMF research has shown that individuals respond differentially to identical electromagnetic perturbations in ways consistent with constitutionally distinct biofield structures [Gorfinkel & Zucker, 2005; Markov, 2007].

The CBP is the electromagnetic substrate of what various research traditions have called the "biofield." It encodes which resonance couplings are constitutively stable (high-weight edges in the immune network graph), which are open to environmental modulation (low-weight, variable edges), and what the individual's characteristic protocol is for maintaining coherence under perturbation.

Note on phenomenological typologies: Several research traditions — including the Human Design system [Ra Uru Hu, 1992], constitutional medicine, and Ayurvedic body-type classification — have independently converged on the observation that individuals exhibit stable, typologically distinct patterns of electromagnetic and energetic response. These typologies, while lacking formal electromagnetic operationalization to date, represent convergent phenomenological evidence for the existence of constitutively distinct biofield architectures. We do not ground our formal propositions in these typologies but note them as sources of research hypotheses and clinical intuition consistent with the CBP framework.

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3. Four Propositions on CBP-Immunity Coupling

Proposition 1: Autonomic Immune Surveillance as Real-Time Coherence Monitor

The immune system maintains a generative model of its molecular environment — a continuously updated prior distribution over tissue states — operating below conscious threshold in real time, generating prediction errors (danger signals in Matzinger's [2002] sense) when observations deviate from the predicted coherence manifold.

We propose that the **visceral-autonomic surveillance network** — the integrated complex of splenic neural innervation, vagal afferent signaling, enteric nervous system activity, and cardiac electromagnetic field monitoring — constitutes the functional organ of this generative model at the whole-body level. This network operates prior to cognitive processing, at the speed of autonomic reflex, and continuously updates the immune system's predictive model of internal coherence state.

Critically, individuals differ in the **structural stability** of this surveillance network. Some individuals exhibit constitutively high autonomic-immune coupling — rapid, reliable prediction-error detection with strong splenic neural innervation and consistent HRV spectral profiles [Thayer & Lane, 2007]. Others exhibit more variable autonomic-immune coupling — adaptive in diverse environments but more susceptible to attractor drift under prolonged perturbation.

This distinction maps directly onto CBP-level spectral architecture: high-coupling individuals have a narrow, constitutively stable surveillance spectral band; low-coupling individuals have a broader, more environmentally modulated surveillance spectrum.

SCENAR and PEMF measurements have repeatedly demonstrated that constitutionally distinct individuals exhibit systematically different bioelectromagnetic response profiles to identical perturbations [Gorfinkel & Zucker, 2005].

Proposition 1 (formal): The structural stability of the autonomic immune surveillance network, as indexed by resting HRV spectral characteristics and splenic neural coupling strength, predicts the spectral gap parameter in the graph-Laplacian immune network model. High-coupling individuals (constitutively stable surveillance) correlate with higher spectral gap (faster coherence restoration); low-coupling individuals correlate with lower spectral gap and greater susceptibility to false-attractor entrainment.

Proposition 2: Individual Free-Energy Minimization Protocol and Low-Action Trajectories

The path-integral formulation of immunological health identifies health with dominance of low-action trajectories: the system moves through phase space along energetically inexpensive paths. Chronic disease corresponds to trapped trajectories with high action costs.

The CBP defines the individual's characteristic **free-energy minimization protocol** — the energetic mode of engaging with environmental perturbation that maintains coherence at minimum metabolic and field-dynamic cost. This is not a behavioral prescription; it is the electromagnetic equivalent of impedance matching: when a system operates within its

constitutive spectral range, energy transfer is efficient; when forced outside that range, energy costs escalate.

Individuals operating within their constitutive electromagnetic regime — engaging with environmental stimuli in ways consistent with their CBP spectral architecture — maintain low-action immunological trajectories. Individuals chronically forced outside their constitutive regime generate persistent low-amplitude field mismatches that accumulate as coherence disruption. This is the field-theoretic mechanistic basis for the well-documented relationship between chronic psychosocial stress and immune dysregulation [Segerstrom & Miller, 2004]: chronic behavioral-environmental misalignment produces chronic electromagnetic impedance mismatch, which is experienced subjectively as stress and measurably produces elevated inflammatory markers.

Proposition 2 (formal): Alignment between environmental demands and individual CBP spectral architecture predicts the predominant trajectory class in immune phase space. Aligned individuals exhibit low free-energy immune trajectories (high health-span); chronically misaligned individuals exhibit elevated free energy corresponding to attractor drift toward chronic inflammatory states.

Proposition 3: Constitutive Spectral Couplings and Immune Network Graph Topology

The CBP encodes a distribution of **stable** and **environmentally modulated** spectral coupling pathways. Stable couplings — constitutively active electromagnetic pathways with high spectral coupling — correspond to high-weight edges in the immune network

graph. Modulated couplings correspond to low-weight, variable edges susceptible to transient entrainment.

In the graph-Laplacian network model, the spectral gap is determined by the strength distribution of edge weights. High-weight edges contribute to a high spectral gap and rapid coherence restoration. Variable edges create spectral vulnerabilities through which coherence disruption can propagate — but also represent the primary locus through which beneficial electromagnetic entrainment (such as live vaccine perturbation) acts.

This proposition provides a field-theoretic account of a key NSE asymmetry: why do live vaccines produce broad coherence benefits while some killed vaccines do not? Live vaccines deliver a rich, multi-frequency electromagnetic perturbation that engages variable-coupling pathways, temporarily entraining them toward higher coherence through a mechanism analogous to stochastic resonance [Moss et al., 2004]. Killed vaccines, delivering narrower perturbation signatures, may selectively reinforce specific couplings without improving global spectral architecture — or may disrupt variable couplings without providing the global restoring signal.

Individual variation in NSE outcome is thus predicted by the distribution of stable vs. variable spectral couplings in the CBP — a parameter that is in principle measurable via biophoton emission spectroscopy, HRV power spectral analysis, and electromagnetic impedance profiling.

Proposition 3 (formal): The distribution of stable vs. environmentally modulated spectral couplings in an individual's CBP predicts the topology of their immune network spectral structure. Stable couplings predict high-weight graph edges; modulated couplings predict

open, variable edges. This topology modulates the individual's NSE profile — the direction and magnitude of coherence shift in response to vaccination or other immune perturbations.

Proposition 4: Chronic Exogenous Electromagnetic Entrainment as False-Attractor Induction

The most clinically significant proposition concerns the phenomenon of **chronic hetero-field entrainment**: the sustained influence of external electromagnetic fields on an individual's constitutively variable spectral couplings. Maxwell's equations predict that oscillating electromagnetic fields in proximity will couple and exchange energy through inductive and radiative mechanisms. Living organisms are electromagnetic field generators and receivers. When an individual is in sustained proximity to others whose electromagnetic field structure differs significantly from their own, their variable-coupling spectral pathways are subject to chronic entrainment toward the external field configuration.

This is not a hypothetical mechanism. McCraty et al. [2009] demonstrated measurable cardiac electromagnetic field coupling between individuals in sustained proximity. The entrainment magnitude is proportional to coupling duration, the amplitude of the external field, and the degree to which the external field overlaps with the individual's variable spectral pathways (not their stable ones).

The immunological consequence is the **false-attractor problem** (Layer 2 of the coherence model). The chronically entrained individual's immune system achieves local coherence — it is not in chaos — but the attractor it has settled into reflects the external field configuration rather than the individual's own constitutive electromagnetic baseline. The generative model has incorporated false priors derived from the entraining field. Prediction errors are generated not against the individual's own coherence manifold but against an externally imposed pseudo-manifold.

Autoimmune pathology, in this framework, is not primarily a failure of self-tolerance but a false-attractor state induced by chronic misalignment between the individual CBP and the operative electromagnetic environment. The "self" that is attacked reflects a conditioned pseudo-manifold rather than the constitutive biological self.

Chronic fatigue syndrome and related functional somatic syndromes may similarly represent false-attractor entrapment in individuals with constitutively broad variable-coupling architectures who are chronically entrained by high-field-strength environments — a prediction consistent with the documented relationship between CFS onset and sustained high-demand social or occupational environments.

Proposition 4 (formal): Prolonged CBP-incongruent electromagnetic entrainment constitutes chronic false-attractor induction in the immune network's probability distribution. This predicts: (a) elevated chronic inflammatory markers in chronically entrained individuals; (b) autoimmune vulnerability mediated by false-prior accumulation in the immune generative model; (c) resolution of chronic inflammatory states through de-entrainment — environmental restructuring that removes the entraining field sources and restores CBP-baseline attractor topology through targeted PEMF/SCENAR protocols.

4. Implications for Coherence Medicine

4.1 CBP-Stratified Vaccine Response

The propositions above predict systematic individual variation in vaccine NSE profiles, structured by CBP parameters:

- Individuals with constitutively stable spectral architecture (high HRV coherence, strong autonomic-immune coupling, narrow CBP variance) will show smaller but more robust positive NSEs — their baseline coherence is high, and the vaccine reinforces existing structure.
- Individuals with constitutively broad variable-coupling topology will show larger, more variable NSEs — the vaccine entrains open spectral pathways and the direction of effect depends on the individual's current attractor state.
- Chronically entrained individuals operating far from their CBP baseline may show paradoxical or attenuated NSEs if the perturbation reinforces the false-attractor state rather than the constitutive baseline.

This predicts that CBP profiling — operationalized via HRV spectral analysis, biophoton emission profiling, and electromagnetic impedance mapping — could serve as a stratification variable in vaccine NSE research, explaining a significant proportion of currently unexplained individual variance.

4.2 De-entrainment as Immune Therapy

If chronic false-attractor entrainment is a primary driver of autoimmune and chronic inflammatory pathology, therapeutic strategy should prioritize **de-entrainment** — structured removal of CBP-incongruent electromagnetic entraining influences — alongside or prior to conventional intervention.

De-entrainment protocols include: environmental restructuring to reduce sustained hetero-field exposure; and active CBP baseline restoration through PEMF or SCENAR protocols tuned to the individual's constitutive spectral structure rather than population-average parameters.

4.3 CBP-Calibrated PEMF and SCENAR Protocols

Soviet-era electromagnetic medicine developed SCENAR and PEMF protocols on the basis of population-average biofield parameters. The CBP framework suggests these protocols can be significantly refined by individualization. The target is not the individual's current (potentially entrained) electromagnetic state but their constitutive baseline attractor — the field structure toward which de-entrainment should drive the system.

This convergence of CBP profiling with electromagnetic therapeutic modalities represents a tractable near-term research program: measure individual CBP parameters, identify deviation from constitutive baseline, design perturbation protocol targeted at restoring that baseline, measure immunological coherence endpoints.

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5. Discussion

5.1 Relationship to Existing Biofield Research

The present framework extends an established empirical tradition. McCraty et al. [2009] documented stable individual differences in cardiac electromagnetic field structure and inter-individual entrainment. Popp [1992] established coherent biophoton emission as an individual-characteristic biological parameter. Oschman [2000] synthesized multiple lines of evidence for electromagnetic field organizing principles in biology. SCENAR research documented constitutionally differential electromagnetic response [Gorfinkel & Zucker, 2005]. The CBP framework extends this body of work by providing a formal attractor-theoretic account of why individual electromagnetic differences matter for immune coherence dynamics.

5.2 Relationship to the Danger Model

Matzinger's Danger Model [2002] proposed that the immune system responds to damage signals rather than foreignness. The coherence model reframes this: danger signals are prediction errors in the individual's generative model of their tissue coherence manifold. Whether a given signal registers as a danger prediction error depends on the individual's CBP-baseline attractor topology — what is a normal oscillation for one electromagnetic configuration may constitute genuine coherence rupture for another. The Danger Model describes the trigger; the CBP-Coherence model describes the individual attractor landscape within which that trigger is interpreted.

The CBP framework as applied to immunology is currently a theoretical proposal. Primary limitations:

1. **Operationalization**: Mapping CBP parameters onto measurable bioelectromagnetic quantities requires systematic empirical development. Candidate domains: biophoton emission spectra, HRV power spectral analysis, PEMF response curves, cytokine network topology.
2. **Validation**: Predictive validity of CBP profiling for health outcomes requires prospective study. Retrospective Blueprint-stratified analysis of existing NSE epidemiological datasets is a feasible initial design.
3. **Mechanistic chain**: The proposed chain from CBP spectral topology → immune network spectral structure → NSE profile involves multiple inference steps each requiring independent validation.

A structured research program proceeds in three phases: (1) develop CBP-to-bioelectromagnetic measurement mappings; (2) conduct CBP-stratified analysis of existing NSE epidemiological datasets; (3) design CBP-calibrated PEMF/SCENAR intervention trials with immune coherence endpoints.

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6. Conclusion

The coherence-field model of immunity, grounded in Maxwell's field equations and the

19LQVM, provides a principled framework for understanding the immune system as a multi-scale phase-synchronization apparatus rather than a combat force. The present paper extends this framework to individual variation through the concept of the Constitutive Bioelectromagnetic Profile.

We have proposed four interlocking propositions: that the autonomic immune surveillance network functions as the immune system's real-time coherence monitor through visceral interoceptive electromagnetic fields; that alignment between environmental demands and individual CBP architecture determines the action cost of immunological trajectories; that constitutive spectral couplings correspond to the graph-theoretic structure of the immune network; and that chronic exogenous electromagnetic entrainment constitutes false-attractor induction with autoimmune and chronic inflammatory consequences.

The practical implications are significant. CBP-stratified vaccine NSE research could resolve a major source of unexplained immunological variance. CBP-calibrated electromagnetic therapy could individualize coherence medicine. De-entrainment protocols could offer a novel therapeutic pathway for autoimmune and chronic inflammatory conditions — targeting attractor topology rather than inflammatory output.

Health, in this framework, is not the absence of pathogens. It is the maintenance of an individual's constitutive electromagnetic coherence structure in dynamic equilibrium with the environment — the immune system operating on its own attractor, following its own low-action trajectories, monitoring coherence through its own characteristic field signature.

The next generation of immune medicine will not ask only "what pathogen attacked?" It will ask: "whose electromagnetic attractor has been lost, and how do we restore it?"

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