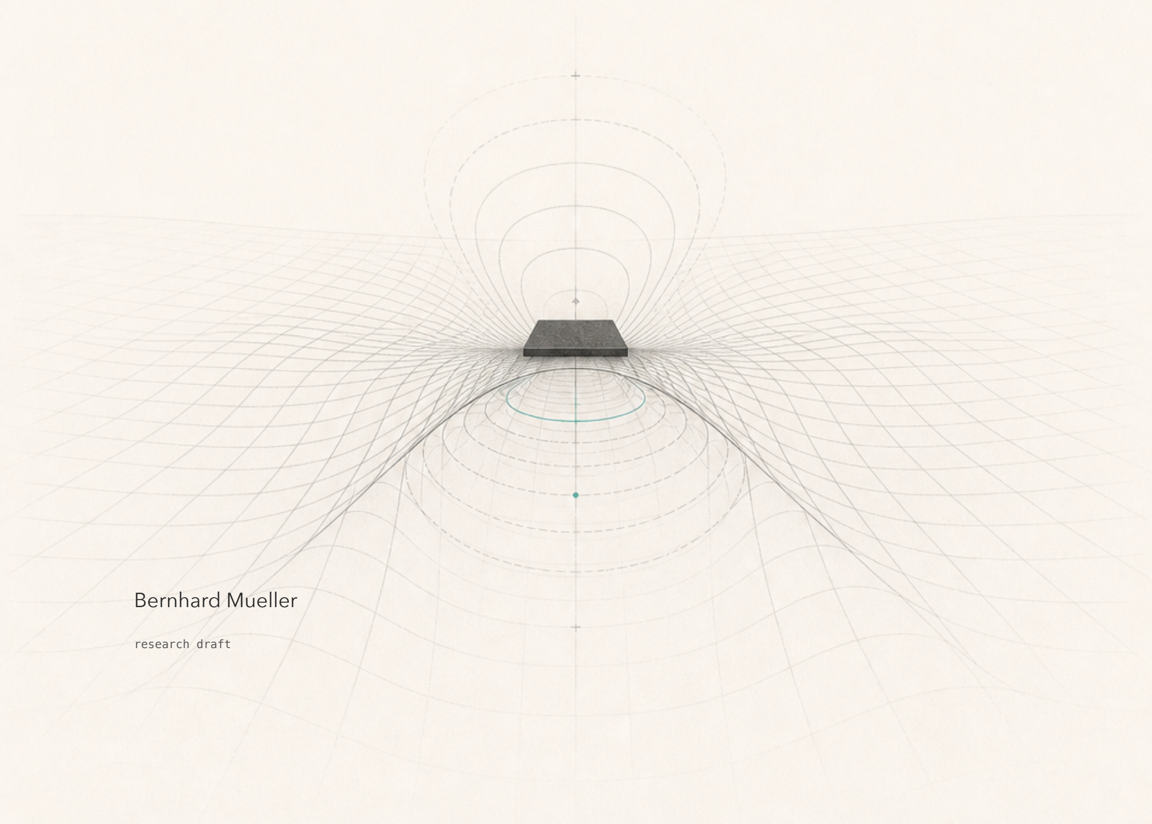
Hacking the simulation: The anti-gravity exploit

A practical guide to dark matter,
self-reading systems, and the first lift experiment



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research draft

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Preface

In Douglas Adams's Hitchhiker books, flying is achieved by falling, getting distracted at the crucial moment, and missing the ground [1]. The OPH version starts as a local lattice experiment with a scale. The object keeps its atoms and inertial mass. The PoC uses its own boundary, records, and feedback loop to create a signed scalar source. The proposed repair-charge rotor determines conditionally how that source can exchange force and momentum with an external repair field.

The word observer carries the trick. In OPH, observer means a bounded patch with an accessible boundary, durable records, a self-read or internal state estimate, future behavior conditioned by those records, boundary predictions that beat shuffled controls, and checkpoint continuation within declared error. Reality, in this picture, is the shared world that remains when finite patches compare their overlapping records and repair disagreements. The goal is to build the smallest machine that can behave like one of those patches on a lab bench.

In reverse engineering, a reverser takes the binary, watches its calls, traces its state changes, annoys the kernel, stares at the crash, and slowly learns which parts of the target are policy and which parts are physics. Windows became exploitable because people mapped the object manager, the driver model, the memory allocator, the system calls, and the places where two reasonable subsystems made one unreasonable promise together. OPH applies that discipline to reality itself. The larger OPH book reverse-engineers the substrate: local observer patches, shared records, repair of disagreements, and the public world that drops out when those records settle [2,15].

Gravity is one output of that machinery. In ordinary life it behaves with insulting reliability. Put a cup on a table, and the table pushes back. Drop a wrench, and the floor wins. The map becomes interesting where the same record-repair machinery has a dark-sector continuation.

The usual reading of dark matter has strong empirical support: galaxies rotate too fast, clusters bind too strongly, lenses bend too much light, and the CMB asks for a large gravitating component that does not shine [3,16,17]. OPH accepts that evidence and asks whether finite record-repair structure can reproduce some of the same gravitational behavior. The dark-sector paper proposes a repair-charge rotor whose dilute phase behaves like dust and whose cubic condensed phase gives the spherical deep-galaxy scaling [10]. Those results are conditional on the proposed action.

This book is about the local branch. It explains what gravity is in OPH, how the dark-sector continuation motivates a same-channel lab question, what the susceptibility coefficient χ_ν measures, and why material structure is only a carrier candidate. The OPH source is a public self-read receipt, meaning a compact evidence packet showing that the object reads its own boundary, stores records, uses those records to predict later boundary behavior, and produces separate top and bottom coherence scores:

$$S^{\text{can}}_{\text{coh}} = \mathbf{1}_{\text{self-read}} R_U P_U C_U .$$

The novelty is OPH-shaped. The experiment is a self-reading source test with a balance attached. Public reviews of Biefeld-Brown and lifter devices put their thrust in electrohydrodynamic air motion, and a full-scale rotating-superconductor replication reported no gravity-like force at its sensitivity [20,21,22]. Those experiments are useful warnings: air push, heat leak, electromagnetic coupling, and balance error have to be killed first. The OPH question is narrower: can a bounded object produce a signed self-read source, establish its repair-charge calibration and external field independently, reject the dummy, and make the scale follow the rotor force law while power, heat, charge, vibration, and handling fail as explanations.

That specificity is why an accidental discovery is unlikely. A normal lab can stumble across a weight anomaly. Without same-zone drive/read ports, onboard records, predictive boundary tests, separate top and bottom scalar estimates, sign reversal, flip reversal, dummy rejection, and a replayable evidence bundle, the anomaly belongs in the artifact pile. A private or classified result has the same problem for science. Until the evidence packet can be checked, it is only a story about a scale.

Expected results come in layers. The object either produces the preregistered scalar receipt or it does not. The balance then supplies a controlled force residual. That residual constrains the rotor completion only when the scalar, dimensional repair-charge calibration, and external repair field were established independently and the momentum and energy ledgers close.

Alex Osika of SNRGY Studios deserves special thanks here. He was the first person to turn OPH from blackboard theory into hardware, taking the

observer-patch idea seriously enough to ask what ports, records, timing, coupling, and readout would look like on a bench [11]. This anti-gravity exploit follows that same instinct: stop admiring the theory from a distance and build the smallest machine that can produce a bench result.

The Missing Gravity

Vera Rubin spent long nights in the 1970s measuring the rotation of galaxies with Kent Ford's image-tube spectrograph [3]. The instrument caught faint light efficiently enough to track stars far out in spiral galaxies. Those stars should have slowed as they moved farther from the luminous mass. The measured velocities stayed high. The flat rotation curves were points on plots.

The same complaint arrived from other directions. Galaxy clusters held together too tightly. Gravitational lenses bent background light more strongly than visible matter allowed, with merging clusters giving especially hard examples because the lensing peaks can separate from the hot X-ray gas [16]. The cosmic microwave background, when read as a statistical fossil of the early universe, wanted a large gravitating component invisible to telescopes [17].

The standard answer is dark matter: an unseen substance, massive enough to gravitate, quiet enough to avoid ordinary electromagnetic detection, abundant enough to shape galaxies and clusters. That answer dominates cosmology because it fits a wide range of data better than any simple rival. It also carries a permanent irritation. Decades of direct searches have produced no confirmed dark-matter particle. Galaxy data add a second irritation: rotation curves track visible baryons with suspicious discipline, especially in the SPARC sample and the radial acceleration relation [18,19].

OPH begins with finite observer-like systems: bounded patches with local state, ports, readback records, repair moves, and public evidence bundles [2,10]. The finite theory identifies a scalar repair register and fixes the canonical coherent-source coefficient. It does not assign that register a conjugate variable or propagation law.

The dark-sector paper proposes the missing dynamical object: integer repair occupation n and a conjugate repair phase θ form a lattice rotor. Its action has a repair-current balance law and a field stress. In the dilute homogeneous phase it behaves like pressureless matter. In the spherical cubic condensed phase it gives

$$a_R = \sqrt{a_b a_0}, \qquad v^4 = G M_b a_0.$$

Those are conditional consequences of the proposed rotor action. The OPH derivation of the action, its source constants, relativistic completion, abundance, lensing, cluster, CMB, and Solar-System evidence remain open.

The same action gives the chi-nu bench experiment a lawful local force route. Coherent matter can carry repair charge. In an external repair gradient it can exchange momentum with the repair field. A compact repair-neutral device cannot lift itself from an internal top-to-bottom contrast.

The lift experiment begins before the balance. It begins with the receipt:

$$S^{\mathrm{can}}_{\mathrm{coh}} = \mathbf{1}_{\mathrm{self-read}} R_U P_U C_U.$$

The PoC has to define that source, measure it for top and bottom zones, reverse its sign, and survive shuffled-record and dummy controls. Only then does a support-force measurement become an OPH test.

Observer Patch Holography Without the Formalism

OPH starts with the kind of fact physics often hides under the floorboards: every actual observer has finite access [2,14,15]. Each observer holds a local slice of the universe. A detector has a boundary, a memory, a calibration, a clock, and a limited interface to the rest of the world. A human observer is richer. The basic shape is the same: a patch, a state, a boundary, and records that can survive being read.

The formal papers write observers in algebraic language. The hardware-facing test is more operational:

$$\begin{aligned}\text{observer-like patch} = {} & \text{bounded interface} + \text{durable records} \\ & + \text{self-read} + \text{record-conditioned update} \\ & + \text{prediction tests} + \text{checkpoint continuation.}\end{aligned}$$

The boundary is where the patch meets other patches. The records are internal distinctions that can be read again. The update law says how the patch changes after a boundary event. Checkpoint continuation means that a declared record/interface checkpoint predicts subsequent observable behavior within declared error. Shuffled-record controls matter because ordinary logging is cheap. Observer-like status requires records that actually condition the next boundary behavior.

Measurement, in this language, is a read, compare, record, and update event. A signal crosses a boundary. The patch compares that signal with its present state. The result becomes a stable record. Subsequent behavior changes because the record exists. A photon passing through empty space is a carrier. A photon absorbed by a photodiode and stored in a timestamped log has entered an observer-facing record system.

Gravity enters through agreement across such finite descriptions. If neighboring patches expose overlapping records and keep repairing mismatch, stable shared structure can emerge. In the recovered-core chain, with the extra branch conditions in place, that logic reaches Lorentz structure, support-visible BW scaling, the null-stress bridge, fixed-cap stationarity, small-ball area variation, and a Jacobson-type Einstein branch [8,14].

Bare finite consensus is too weak to recover Einstein gravity by itself. The recovered gravity branch is a specific theorem surface with its own assumptions.

For the lift experiment, the hardware requirement is sharper. Observer status comes from operation: ports, records, update rules, boundary prediction, and checkpoint continuation. A crystal can store information in its structure. A resonator can ring. A ferroelectric can polarize. Those facts may help build an active patch. The scalar $S_{\mathrm{coh}}^{\mathrm{can}}$ appears only when the self-read evidence passes.

The hardware version of an OPH patch has to expose ports. It has to drive and sense through those ports. It has to keep logs that can be re-read. It has to show that the logs predict subsequent boundary readouts better than shuffled records or dummy controls. It has to survive a declared checkpoint test. An object without those pieces can be interesting matter. It lacks the OPH scalar-channel source.

The Echosahedron idea is the clean reference image [11]: a bounded twelve-port body whose same boundary elements can transmit and receive, with a coupling matrix and records that make the state of the boundary inspectable. The lift PoC can use different geometry. The same discipline applies. The object has to measure its own boundary, keep the result, and show that the result changes later boundary behavior.

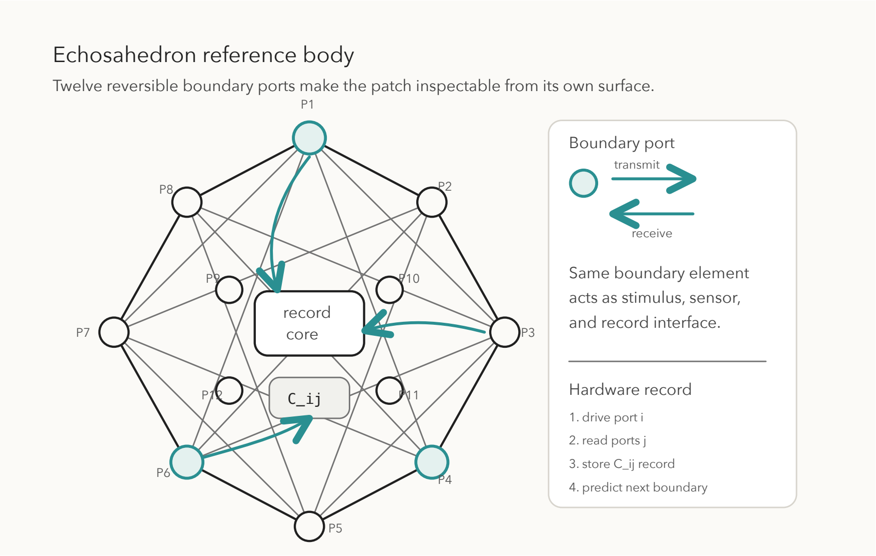

Figure 1: Echosahedron reference body with twelve reversible boundary ports, a record core, and a coupling matrix.

What Gravity Really Is

The ordinary picture of gravity is a hand pulling things down. It is the picture every falling cup teaches. A dropped wrench accelerates toward the floor, a bathroom scale pushes back against your feet, a planet circles the Sun as if an invisible rope were tied between them.

Newton made that picture quantitative [4]. Two masses attract one another with a force proportional to their masses and inversely proportional to the square of their distance. The formula works so well that it can feel like the final answer. Newton himself knew the action-at-a-distance picture was strange. The Earth reaches across empty space and tells the Moon how to move. The Moon answers without a messenger anyone can see.

Einstein changed the picture [5]. Gravity became geometry. A planet needs no invisible rope. It follows the straightest available path in curved spacetime, and the Sun's mass changes what straight means nearby. John Wheeler's summary captures the business: spacetime tells matter how to move, and matter tells spacetime how to curve [6].

OPH asks why that geometry appears in the first place.

The OPH answer, on the recovered branch, is that gravity is the public geometry forced by observer consistency [14]. Finite observer patches keep local records. Neighboring patches overlap. Their records must agree where they describe the same accessible events. Under the recovered-core assumptions, the rule that keeps those records mutually recoverable becomes the geometry we call spacetime. Curvature is the shared structure that makes local descriptions fit together.

This keeps gravity physical. A bridge needs engineering. A GPS satellite needs relativistic clock corrections. A black-hole merger sends gravitational waves through LIGO [7]. The claim is about what gravity is underneath those facts. Gravity is the stable large-scale shape of compatible records, clocks, horizons, stress-energy, and entanglement on the branch where the OPH recovery hypotheses apply.

The usual Einstein equation is the compact version of that deal. One side describes the shape of the public stage. The other side describes the stuff that forces the stage to take that shape:

$$G_{\mu\nu} + \Lambda g_{\mu\nu} = \frac{8\pi G}{c^4} T_{\mu\nu}.$$

The left side is geometry. The right side is matter and energy. OPH reads this relation as an overlap-consistency output on the recovered branch. Bare consensus alone is too weak. The branch needs geometry readout, support-visible BW scaling, the null-stress bridge, fixed-cap stationarity, small-ball area variation, and tensor upgrade [14].

For the hack, keep the picture close to the bench. Every patch has local records. Neighboring patches compare overlapping events. Public geometry is the stable shape that survives those comparisons. Ordinary matter affects that shape through stress-energy. The anti-gravity exploit asks whether a very specific record-bearing object can create a tiny extra scalar source that a local support-force measurement can test.

$$\text{gravity} = \text{public geometry of compatible records.}$$

The lab connection is narrow. The PoC creates a signed coherent-material receipt for the scalar source used by the chi-nu continuation. Cluster stress, CMB likelihoods, and cosmology claims live elsewhere. If the receipt is absent, there is no OPH source. If the receipt is present, the balance can test the proposed repair-charge rotor and its field-momentum ledger.

The Exploit Model

Security work begins by accepting the target on its own terms. Windows has a kernel, a memory manager, objects, handles, access checks, timers, drivers, and strange historical corners nobody would design twice. A reverser maps the system as found, including the ugly parts. After the map is good enough, crashes turn into usable control: an info leak, a controllable pointer, a race window, a misplaced memory update.

The OPH gravity hack uses the same discipline. The target is the observer-patch repair structure: finite patches, exposed boundaries, record algebras, update rules, coherence scores, and the public geometry produced after local descriptions settle into agreement. In this book, "simulation" names that OPH finite-patch fixed-point and repair reading. Conventional rendered-world simulation language and generic substrate claims are outside the claim [15].

The test variable is a vertical record asymmetry.

The machine leaves Earth's mass alone. It creates a bounded active patch whose top and bottom zones produce different self-read coherence receipts:

$$\Delta S^{\mathrm{can}}_{\mathrm{coh}} = S^{\mathrm{can}}_{\mathrm{bottom}} - S^{\mathrm{can}}_{\mathrm{top}}.$$

That scalar is the controlled input. The PoC tries to make this bottom-minus-top number nonzero, signed, repeatable, and independently measurable. The finite channel coefficient tells us how the local record count responds. A separate action must turn that response into a physical force.

Here is the same mechanism without notation. The top half and bottom half each have to earn an observer-like score. A zone earns that score only if it reads its own boundary, keeps stable records of what it read, uses those records to predict later boundary behavior, and shows coherent mismatch reduction in the visible port data. A noisy sensor trace, raw vibration, heat, stored energy, or a pretty resonance is not enough.

The device then subtracts the two earned scores. If the bottom score is larger than the top score, the signed contrast is positive. If the top score is larger, it is negative. If both halves earn the same score, the contrast is zero. The sign belongs to the record asymmetry, so $ACTIVE+$, $ACTIVE-$, and physical flip runs have to move the scalar in the declared way while matched-power and dummy runs reject ordinary heat, electromagnetic, and handling artifacts.

Why might that affect weight? OPH's recovered gravity branch says that gravity is the public geometry of compatible records, but that branch by itself gives ordinary gravity and no bench lift knob [14]. The chi-nu continuation adds a narrower result: a nondegenerate self-reading coherent-material source can enter the scalar edge-center register used by the collar response [9,11].

The repair-charge rotor is the proposed local-lattice completion. It promotes repair occupation n and repair phase θ to a canonical pair. Coherent matter enters its source equation with charge density

$$\mathcal{Q}_{\text{coh}} = q_\star \chi_\nu^{\text{can}} S_{\text{coh}}^{\text{can}}.$$

A device with integrated repair charge Q_R^{dev} in an external repair gradient experiences

$$F_i^{\text{dev}} \simeq -Q_R^{\text{dev}} \partial_i \theta_{\text{ext}}.$$

The rotor stress carries the reaction momentum. A repair-neutral internal contrast produces no uniform-field support force. A driven neutral device needs measured outgoing repair-current and momentum flux.

If the vertical component of this conditional force is upward, the balance sees it as a change in support force. A normal object at rest on a scale has gravity pulling down and the pan pushing up. The scale reports the upward normal force required to hold the object in place.

The completed model would have the support equation

$$N = Mg - F_\chi.$$

If $F_\chi = Mg$, the normal force N goes to zero and the scale reads zero. This is a conditional support-force limit. The first milestone is a replayable scalar receipt. A force bound becomes a theory bound only after the action supplies a calibrated map. Inertial mass stays unchanged in the proposed branch.

Every practical rule in the build follows from this model.

Practice	Theory reason	OPH effect tested
Build a bounded PoC	The branch source is a bounded patch with a declared boundary.	The object has a local region whose records can enter the evidence packet.
Use self-reading ports	$\mathbf{1}_{\text{self-read}}$ gates the scalar.	The patch reads its own boundary state through its own ports.
Write stable records	R_U gates the scalar.	The state survives as durable, re-readable evidence.
Predict boundary readout	P_U gates the scalar.	Real records beat shuffled-record and dummy controls.
Measure both zones	The rotor force depends on integrated repair charge as well as orientation.	The PoC exposes source sum, difference, and commanded sign.
Reverse the sign	A candidate force response must follow the measured repair charge.	The balance test rejects power-budget artifacts with matched controls.
Flip the PoC	A flip is diagnostic only relative to a measured external repair gradient.	The same internal state is tested against the lab-frame field geometry.
Run a dummy	Ordinary heat and EM effects can fake support-force changes.	The control carries artifacts without the self-read source.

The first machine has to expose the self-read source before the balance run begins. Material order can help carry a mode. The experiment lives or dies by the public boundary record.

The Dark-Sector Continuation

OPH concerns observer-like self-reading systems: bounded patches with local state, ports, readback records, repair moves, and public evidence bundles [2,10,14]. The recovered-core Einstein branch does not supply dark matter.

The Repair-Charge Rotor

The proposed completion gives the scalar repair register a canonical partner. Each lattice site carries signed repair occupation n and a repair phase θ. A cubic phase-gradient energy produces a conserved repair current away from sources. Baryons and coherent self-reading matter enter the same source balance with different dimensional calibrations.

The action supplies four linked consequences:

- finite-region repair-current balance, including boundary flux;
- pressureless scaling in the dilute homogeneous phase;
- the spherical deep-galaxy law $a_R = \sqrt{a_b a_0}$ and $v^4 = GM_b a_0$ in the cubic condensed phase;
- a force on genuine repair charge in an external repair gradient, with the repair-field stress carrying the reaction momentum.

These results are conditional on the proposed action and its constitutive premises. The finite OPH theorems do not derive the rotor pair, dimensional source constants, complete high-gradient law, relativistic limit, abundance, or physical likelihoods.

The Lab Branch

The local experiment tests the coherent-source term of the same rotor action. Its source is a gated, public self-read receipt:

$$S_{\text{coh}}^{\text{can}} = \mathbf{1}_{\text{self-read}} R_U P_U C_U.$$

The rotor source density is

$$\mathcal{Q}_{\text{coh}} = q_\star \chi_\nu^{\text{can}} S_{\text{coh}}^{\text{can}}.$$

The canonical coefficient fixes the channel efficiency. The dimensional calibration $q_\star$ fixes how much repair charge the measured scalar carries. For a slowly varying external repair field,

$$F_i^{\text{dev}} \simeq -Q_R^{\text{dev}} \partial_i \theta_{\text{ext}}.$$

A repulsive sign is conditionally lawful because signed repair occupation can have positive even onsite energy. The device must carry nonzero integrated repair charge or emit repair-field momentum. An internal contrast with zero total charge supplies neither.

The Susceptibility Coefficient

A local gravity hack needs a response number tied to a declared continuation surface. The number is

$$\chi_\nu.$$

The symbol is pronounced chi-nu. The name sticks because it sounds cool.

The local experiment first tests a gated scalar source. The PoC leaves Earth's mass alone. It tries to make its lower half and upper half produce different public self-read receipts. The contrast is the first thing being tested. χ_ν is the finite channel coefficient. Turning that channel response into a support force requires a separate local-lattice action [9].

Support Status

The chi-nu paper separates the support tiers [9]:

Tier	Status	Meaning for the PoC
A	Recovered core	OPH recovers the ordinary gravity branch but leaves χ_ν unassigned.
B0	Coherent-material source theorem	A bounded self-reading coherent patch can define the scalar source receipt.
B1	Scalar-response branch	The finite generator perturbs the same scalar channel. This does not derive a force.
C	Quotient-edge collar branch	Extra dark-sector collar assumptions assign the canonical coefficient.

Tier	Status	Meaning for the PoC
D	Repair-charge rotor completion	The proposed action derives current balance, field stress, and force on genuine repair charge.

A positive coefficient gives no shortcut around the receipt. The coefficient multiplies the source. With no source, there is nothing to multiply.

The paper dependency is narrow:

- The compact SM/GR paper supplies the recovered ordinary gravity branch: support-visible BW/geometric scaling, null-stress bridge, fixed-cap generalized-entropy stationarity, small-ball area variation, tensor upgrade, and the local Einstein branch [14]. That recovered core explains why ordinary gravity is geometry, but it does not supply a lab lift knob.
- The screen microphysics paper supplies the hardware-facing source rules: Operational Observer Test, Finite Scalar-Slot Register, Rank-One Scalar-Slot Completeness on the Quotient-Edge Branch, Scalar Activation Is an Edge-Center Event, Same-Register and Commutation Theorem, Scalar-Channel Exhaustion, No Separate Scalar Carrier, OPH-Coherent Material Subfederation, Canonical Coherent-Matter Scalar Source, Quotient Descent, Nonzero Coherent Scalar Source, Coherent-Matter Same-Channel Forcing, and Unique Scalar Linear Response [11].
- The chi-nu paper supplies the finite scalar-channel calculation, the canonical coefficient, and the conditional repair-charge source and force formulae [9].
- The dark-matter paper supplies the proposed rotor action. Continuity, dilute dust behavior, spherical deep-galaxy scaling, repair-field stress, and force on coherent repair charge follow conditionally from it [10].
- The consensus-protocol paper supplies the fixed-point, record-repair, and simulation-language firewall [15]. Bare consensus alone is too weak for gravity recovery or a chi-nu force.

The repair chain is therefore precise. Recovered gravity gives the comparison background. Screen microphysics defines a self-reading scalar source. The chi-nu continuation fixes the channel coefficient. The rotor action turns the source into repair charge and supplies the field and momentum ledger. The balance tests that proposed completion.

The canonical coefficient is written χ_ν^{can}. Canonical means the theory-side chart, before engineering normalization moves scale into the apparatus model. Under the quotient-edge coherent-matter assumptions, and granting the dark-sector collar lemmas, the chi-nu paper gives

$$0.9320429912748350\ldots \le \chi_\nu^{\mathsf{can}} \le 1.$$

The protected-reserve presence reading gives the exact lower endpoint,

$$\chi_\nu^{\mathsf{can}} = 1 - \frac{P}{24} = 0.9320429912748350\ldots.$$

The P in that expression has provenance. It is a Phase II quantitative closure coordinate from the OPH recovery stack. It selects neither a basic observer size nor a unique hardware carrier. In this manual I write the closure value as $P_\star \simeq 1.6309682$, because P_U names predictive boundary coupling.

The practical rule is modest. A P-coded layout is a predeclared geometry diagnostic. It is tested against a detuned twin. If the P-coded article gives a cleaner self-read receipt than the detuned article under matched mass, power, firmware, handling, and logging, the hardware hypothesis survives its first audit. Force data stay downstream of that comparison.

The Scalar Source

The canonical scalar is a product of gates:

$$S_{\mathsf{coh}}^{\mathsf{can}}(U, t; h) = \mathbf{1}_{\mathsf{self-read}} R_U P_U C_U.$$

The factors are operational:

- $\mathbf{1}_{\mathsf{self-read}}$: the zone reads its own state through its own boundary.
- R_U: repeated runs preserve accessible records within the declared tolerance.
- P_U: those records predict subsequent boundary readouts better than shuffled-record and dummy controls.
- C_U: the measured port data show coherent mismatch reduction and reject unrelated activity.

If any gate vanishes, the scalar vanishes. A beautiful crystal, a loud resonator, a warm electronics board, rest mass, stored energy, or arbitrary coherence stays outside the source branch unless the public receipt passes.

Informally, the contrast is not “the bottom vibrates more than the top.” Vibration, optical phase, electrical impedance, strain, polarization, or ringdown can be the physical carrier used to make and read records. The OPH contrast is the difference between two validated receipt scores extracted from those records. A zone can vibrate strongly and still score zero if it does not self-read, if its records are unstable, if those records do not predict later boundary behavior, or if the apparent coherence is explained by a dummy or shuffled-record control.

In a piezoelectric first prototype, the raw data might be drive windows, sensed ringdown, cross-coupling phases, and top/bottom port features. In an optical prototype, the raw data might be cavity phase, mode splitting, or interferometric readback. Those traces are only inputs to the receipt. The scalar is the gated, quotient-visible score after self-read, record, prediction, and coherence checks.

For the two-zone lift PoC, the same estimator is run twice:

$$\begin{aligned} S^{\mathrm{can}}_{\mathrm{top}} &= \mathbf{1}_{\mathrm{self\text{-}read,top}} R_{\mathrm{top}} P_{\mathrm{top}} C_{\mathrm{top}}, \\ S^{\mathrm{can}}_{\mathrm{bottom}} &= \mathbf{1}_{\mathrm{self\text{-}read,bottom}} R_{\mathrm{bottom}} P_{\mathrm{bottom}} C_{\mathrm{bottom}}. \end{aligned}$$

The multiplication is deliberately unforgiving. A zone with no self-read gets zero. A zone with unstable records gets a small score. A zone whose records do not predict its future boundary readout gets a small score. A zone whose port data show activity without coherent mismatch reduction gets a small score. The score is therefore not "how much signal is present." It is how much observer-like, record-bearing coherence survives the declared receipt tests.

The force test uses the signed vertical difference:

$$\Delta S^{\mathrm{can}}_{\mathrm{coh}} = S^{\mathrm{can}}_{\mathrm{bottom}} - S^{\mathrm{can}}_{\mathrm{top}}.$$

Positive means bottom-over-top. Negative means top-over-bottom. Zero means the PoC did not create an oriented vertical source, even if both halves were active.

The subtraction supplies an oriented scalar for testing. It does not determine the integrated repair charge. The rotor action couples the full scalar source to repair charge, so the experiment must measure the two zone scores and their sum as well as their difference. A charge-neutral top/bottom dipole has no uniform-field force. A nonzero monopole carries a field tail, while a driven source can exchange momentum through repair-current flux.

Force Map

The rotor action gives the coherent repair-charge density

$$\mathcal{Q}_{\mathrm{coh}} = q_\star \chi^{\mathrm{can}}_{\nu} S^{\mathrm{can}}_{\mathrm{coh}}.$$

Here $q_\star$ is the open dimensional calibration. Integrating the source over the device gives

$$Q_R^{\mathsf{dev}} = q_\star \chi_\nu^{\mathsf{can}} \int_\Omega S_{\mathsf{coh}}^{\mathsf{can}} \, \mathrm{d}^3 x.$$

In a repair field that varies slowly across the device, source translation gives

$$F_i^{\mathsf{dev}} \simeq -Q_R^{\mathsf{dev}} \partial_i \theta_{\mathsf{ext}}.$$

This is a force theorem conditional on the proposed action. It is not a numerical lift prediction. Its sign can be attractive or repulsive because repair occupation is signed while the onsite energy depends on $|n|$. The reaction is carried by the repair-field stress:

$$F_i^{\mathsf{matter}} + \frac{\mathrm{d}P_i^R}{\mathrm{d}t} + \oint_{\partial\Omega} T_{ij}^R n^j \, \mathrm{d}A = 0.$$

The old $g^2 A \chi_\nu \Delta S/(4\pi G)$ planar formula is retired. The rotor action does not derive it. Device sizing requires measured or derived values for $q_\star$, the integrated scalar source, and the ambient repair gradient.

Engineering Chart

The engineering chart can make the same physics look smaller by moving large normalization into the apparatus model. If the device model folds a coherent-material normalization N_{coh} into the scalar, then

$$\chi_\nu^{\mathsf{eng}} = \frac{\chi_\nu^{\mathsf{can}}}{N_{\mathsf{coh}}}.$$

For $N_{\mathsf{coh}} \sim 10^{22}$, the engineering coefficient sits near 10^{-22}. The canonical order-one coefficient survives because the invariant object is the product:

$$\chi_\nu^{\mathsf{eng}} \Delta S_{\mathsf{eng}} = \chi_\nu^{\mathsf{can}} \Delta S_{\mathsf{can}}.$$

Moving the gain label creates no force. It only changes which factor carries the normalization. The PoC has to prove the gated scalar independently. The rotor test must then measure or bound repair charge and the external repair gradient, and pass sign, flip, dummy, boundary, and conservation checks.

How the Local Hack Would Work

The local hack is a vertical asymmetry machine.

The PoC has a top zone and a bottom zone. Each zone drives and reads an internal coherent mode. Each zone writes records. Those records predict subsequent boundary readouts. The firmware estimates one scalar for the top and one scalar for the bottom. Their sum and difference are source receipts for the rotor completion.

If the bottom scalar is larger than the top scalar, the $ACTIVE+$ state has one source orientation. Reversing the drive pattern can exchange top and bottom and reverse that dipole. It does not reverse the integrated repair charge when the displayed gated scalar is nonnegative and $q_\star$ is fixed.

A force reversal requires a derived signed source factor or a controlled reversal of the measured external repair gradient. A credible anomaly must follow that preregistered sign operation, vanish in the dummy, survive full-boundary accounting, and close the momentum and energy ledgers. It then tests the rotor completion rather than the finite coefficient alone.

The Simple Experiment

The experiment should stay small enough to understand on a single bench. One object. One balance. One active PoC with a top zone, a bottom zone, its own battery, its own records, and a state schedule that can be repeated without touching the apparatus.

The PoC is the object that tries to produce the OPH lift-source evidence. It does that by producing public records a finite patch can use: a bounded body, a boundary it can read, durable records, future boundary behavior conditioned by those records, predictions that beat shuffled controls, and checkpoint continuation within declared error. The material stack is allowed to be clever. The machine property is the self-reading loop.

The minimal version has six moving parts:

- a resonant plate or coherent insert that can carry a controlled mode;
- reversible or tightly co-located drive/read ports;
- a predeclared geometry diagnostic, optionally P-coded, plus a matched detuned twin;
- top and bottom zones with separately estimated coherence receipts;
- onboard power and onboard logging during the balance run;
- firmware that alternates $SHAM$, $ACTIVE+$, and $ACTIVE-$ states without moving the object.

In a first piezoelectric build, "carry a controlled mode" usually means the object really does vibrate or ring down during internal test windows. That is not the lift source by itself. The vibration is a carrier for self-read: drive a boundary port, read the same or co-located port, store the trace, and ask whether the stored trace predicts later boundary behavior. The top and bottom zones can use vibration, optical phase, strain, polarization, or another measurable mode. The contrast is the difference in the OPH receipt extracted from those modes, not a claim that acoustic shaking pushes upward.

The sequence is the whole trick. The PoC drives its own boundary, measures the response, stores the result, and checks whether that stored result predicts the next boundary response. A passive material sample lacks this loop. A laboratory sensor outside the object leaves the loop outside the PoC.

$$\text{drive} \to \text{self-read} \to \text{record} \to \text{predict boundary} \\ \to \text{repair/update} \to \text{checkpoint} \to \text{repeat.}$$

The first number the PoC has to make is the signed vertical record contrast. The top zone and bottom zone are measured separately with the same receipt test: self-read, record stability, predictive boundary coupling, and visible coherence. If their earned self-read scores match, there is no oriented scalar source. If the bottom score differs from the top score in a controlled, repeatable way, the PoC has made a source coordinate for an action-completion test:

$$\Delta S^{\text{can}}_{\text{coh}} = S^{\text{can}}_{\text{bottom}} - S^{\text{can}}_{\text{top}}.$$

That subtraction is one source coordinate. The rotor test also needs the integrated scalar source, because a charge-neutral dipole has no uniform-field force. $ACTIVE+$ and $ACTIVE-$ can reverse the scalar dipole under matched power. They do not reverse monopole charge unless the source map contains a separately derived signed factor. A physical flip is predictive only relative to a measured external repair gradient. If the balance follows heat, total power, vibration, battery state, or a dummy object instead of the repair-charge receipt, the result is an artifact.

Only after those source measurements exist does the balance become interesting. The rotor completion assigns

$$Q^{\text{dev}}_R = q_\star \chi^{\text{can}}_\nu \int_\Omega S^{\text{can}}_{\text{coh}}\, \mathrm{d}^3x, \qquad F^{\text{dev}}_i \simeq -Q^{\text{dev}}_R \partial_i \theta_{\text{ext}}.$$

Small PoCs are good for balance resolution and bounds on the tested rotor product. Device sizing requires $q_\star$, integrated scalar source, and the external repair gradient. A resonance by itself is too little evidence for the claim.

In $ACTIVE+$, the bottom-over-top scalar has one sign. In $ACTIVE-$, the firmware reverses the phase, handedness, or zoning so the scalar changes sign. When the PoC is physically flipped, the same internal command faces the opposite direction in the lab. This is the bench test in miniature: create the source, reverse the source, rotate the source, and watch which variable the balance follows.

The material can be BiFeO3, a piezoelectric plate, an optical resonator, a strain-coupled laminate, or some unglamorous stack that happens to measure itself cleanly. The OPH property is produced by the self-reading machine. The device produces the receipt: what it can measure, record, predict, replay, and expose at its boundary.

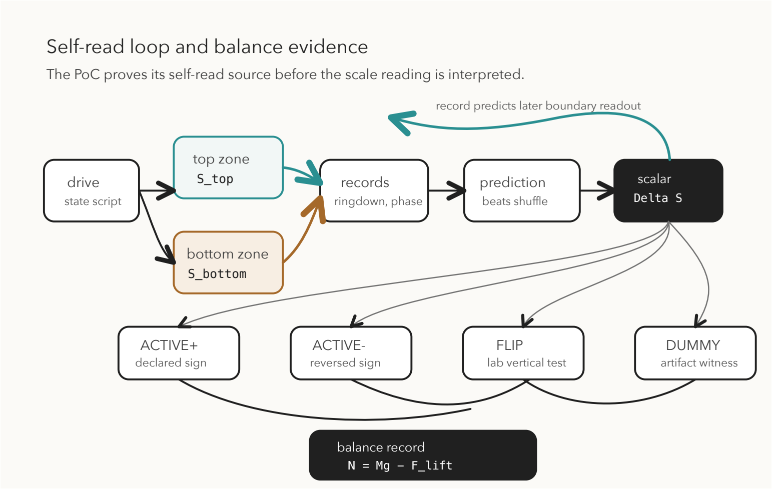

Figure 2: Self-read loop from drive state through top and bottom zones, records, prediction, scalar formation, and balance record.

Build move	Theory reason	Result tested
Make one self-contained PoC	The object under test keeps its patch identity during weighing.	One bounded record source spans all states.
Declare the geometry diagnostic	The P-coded layout is a hypothesis, too weak for theorem-level ruler status.	The detuned twin tests geometry dependence.
Split top and bottom zones	The action-completion test needs an oriented scalar coordinate.	The PoC creates a vertical bias in its public receipt.
Use self-read ports	The scalar is observer-facing.	The patch reads its own boundary.
Store records onboard	Durable records gate the branch.	The patch keeps receipts during the balance block.
Beat shuffled controls	P_U requires predictive boundary coupling.	Real records matter more than shuffled records.
Run $ACTIVE+$ and $ACTIVE-$	The sign belongs to the record asymmetry.	The local scalar reverses under matched ordinary heating.
Flip the PoC	The measured repair gradient supplies the external direction.	The same internal state is tested against the field geometry.

The simple experiment is a self-reading PoC on a balance. The PoC first proves that it can create the oriented record. The balance then supplies a separate force residual for a specified action-completion test.

What Counts as an Observer

An OPH observer begins as a bounded record machine. A person is a rich observer federation with language, memory, bodily self-models, social records, and symbolic recursion. The lift PoC is asked for something smaller and colder. It has to be an observer-like patch in the operational hardware sense.

The bench version is a sealed instrument with ports. Something happens inside the box. The box measures its own boundary, stores the result, and uses that stored result when the boundary is measured again. A camera pointed at a crystal gives the outside lab a record. The experiment needs the object to keep one.

The operational observer test is unforgiving:

- bounded accessible interface;
- durable re-readable records;
- self-read or internal state estimation;
- future boundary behavior conditioned by those records;
- boundary prediction better than shuffled-record controls;
- checkpoint continuation within declared error.

For the susceptibility experiment, the special gate is self-read. The same port, or a tightly co-located transmit/receive pair with fixed geometry, must drive and sense the relevant mode. The PoC has to observe its own state through its own boundary, store a record of that observation, and show that the record matters.

This requirement separates three objects that casual language would blur.

A crystal by itself is a structured material. It can carry order and store history in defects, domains, and strains. Self-read requires an active boundary loop.

A sensor is a transducer. It can convert a physical event into a signal. If the signal is exported and discarded by the object, the sensor stays a peripheral.

An active OPH test PoC is a bounded record machine. It drives, reads, records, predicts, updates, and checkpoints through its own declared boundary. Its logs are part of the object under test.

The pre-balance receipt has to show the difference. Drive each port. Read every port. Save the coupling matrix. Demonstrate same-port or declared co-located readback. Repeat state runs until record stability is measured. Use records from cycle t to predict held-out boundary readouts at $t+1,\dots,t+h$, and compare those predictions against shuffled-record and dummy baselines. Declare the checkpoint error and show continuation inside it. Compute $S^{\text{can}}_{\text{top}}$ and $S^{\text{can}}_{\text{bottom}}$ separately.

That receipt gives the balance experiment an OPH scalar channel to test. The proposed repair-charge rotor supplies the conditional force law; its dimensional calibration and external field require independent receipts.

Hardware adds one warning [11]. A strict Echosahedron-class implementation uses reversible transmit/receive boundary ports. Some contractor-friendly OMEGA bodies use separate source and detector channels for buildability. That may be a useful calibration architecture. Strict same-port self-read requires reversible ports, and the lift PoC has to declare exactly which version it implements.

Machine Requirements

A gravity-hack machine, in the OPH sense used here, is a bounded active object that can prove it has produced the required self-read source before anyone asks a balance to believe it.

The build treats self-read as the machine property. Material order can help carry the mode. The gated receipt supplies the source. Heat, rest mass, stored energy, and arbitrary coherence sit outside the scalar unless the receipt gates pass.

Requirement	What the machine must show	Original mistake avoided
Bounded patch	The active region has a declared inside, outside, and boundary.	Treating a loose material stack as an observer patch.
Same-zone drive/read	The relevant mode is driven and read through the same port, or through a tightly co-located transmit/receive pair with fixed geometry.	Confusing ordinary external sensing with self-read.
Declared geometry diagnostic	Any $P_\star \simeq 1.6309682$ layout is recorded before assembly and paired with a detuned twin.	Treating a quantitative closure coordinate as a hardware theorem.
Stable records	Every run stores re-readable records: state label, port response, coupling matrix, phase or ringdown features, drive monitor, temperature, and battery state.	Producing a balance number with no internal receipt.
Predictive boundary coupling	Records from cycle t predict held-out boundary readouts better than shuffled records and dummy controls.	Logging activity that has no predictive relation to the boundary.
Checkpoint continuation	A declared checkpoint predicts subsequent observable behavior within declared error.	Letting transient states masquerade as observer-like continuity.

Requirement	What the machine must show	Original mistake avoided
Visible coherence	Port data show state-dependent mismatch reduction, phase locking, or repeatable coherent response.	Mistaking unrelated vibration or heating for coherence.
Top/bottom scalar	The machine estimates $S^{\text{can}}_{\text{top}}$ and $S^{\text{can}}_{\text{bottom}}$ separately.	Assuming vertical asymmetry from geometry or material choice.
Integrated scalar	The machine reports the full-volume source integral as well as the top/bottom difference.	Mistaking a repair-neutral dipole for a repair monopole.
Repair-charge calibration	A separate receipt establishes or bounds $q_\star$.	Inferring repair charge from the balance force under test.
External repair field	A separate instrument measures or generates $\nabla\theta_{\text{ext}}$, or measures outgoing repair-field momentum.	Assuming Earth's gravitational field is automatically the repair gradient.
Sign control	$ACTIVE+$ and $ACTIVE-$ command opposite signs of $\Delta S^{\text{can}}_{\text{coh}}$.	Calling a one-sign weight shift a theory signal.
Self-contained weighing	Battery power and onboard logging during balance runs. No force-bearing cables.	Letting wires, grounds, USB leads, or power supplies create false forces.
Artifact twin	A dummy PoC matches mass, heat, battery, electronics, shielding, timing, and handling. It lacks valid self-read.	Rejecting an easy dummy that misses ordinary artifacts.
Evidence bundle	Manifests, hashes, calibration records, raw traces, receipt JSON, verifier code, and exact commands are stored together.	Leaving the result dependent on memory, screenshots, or hand-picked intervals.

The requirements table is deliberately unforgiving because the scalar is a product. A single missing factor kills the source. The device either has self-read, stable records, predictive boundary coupling, and visible coherence, or it has no OPH scalar for the balance to test.

The key scalar is

$$S^{\text{can}}_{\text{coh}}(U, t; h) = \mathbf{1}_{\text{self-read}} R_U P_U C_U.$$

The indicator $\mathbf{1}_{\text{self-read}}$ gates the scalar. If it is zero, the whole scalar is zero. A machine with no stable records also gives zero. A machine whose records miss its boundary behavior gives zero. A machine with activity and no visible coherence gives zero.

$P_\star$ and P_U are different pieces of the story. $P_\star$ is the declared geometry diagnostic, inherited from the quantitative closure branch. P_U is the measured predictive-boundary factor in the self-read score. A useful PoC needs P_U. A P-coded layout is a hypothesis about how to get a cleaner receipt, tested by the detuned twin.

After the source passes the gates, the PoC records both the vertical difference and the integrated source:

$$\Delta S_{\mathrm{coh}}^{\mathrm{can}} = S_{\mathrm{bottom}}^{\mathrm{can}} - S_{\mathrm{top}}^{\mathrm{can}}.$$

The difference controls orientation. The integral controls repair monopole charge. Only after those quantities, $q_\star$, and the external repair field have independent receipts can the balance test the rotor force law.

The First Real PoC

The first credible test article is a self-contained active PoC and a matched dummy PoC. The active PoC is the object being tested. The dummy is an artifact witness with the same mass, outline, battery, electronics envelope, heat signature, shielding, and handling protocol. It lacks a valid self-reading coherent mode.

The simplest active architecture is a battery-powered resonant plate with piezoelectric or optical ports. The same transducers drive the plate, then sense ringdown and cross-coupling. If the prototype uses separate transmit and receive elements, they should be tightly co-located, fixed in geometry, and labeled as logical self-read. Strict same-port status belongs to reversible ports. Firmware alternates drive windows and read windows. It records the coupling matrix, extracts stable features, runs checkpoint tests, and commands $ACTIVE+$ and $ACTIVE-$ phase patterns that are supposed to reverse the top/bottom coherence contrast.

The PoC is the test article: a sealed, battery-powered instrument carrying its own drive signals, sensors, records, verifier inputs, and clock onto the balance pan. Each hardware choice exists to expose or protect the self-read source.

Minimum test article:

Part	Minimum specification
PoC size	Start near 80×60 mm, so $A_\perp = 4.8 \times 10^{-3}$ m^2. A circular PoC with similar area is acceptable. Treat this as a bench footprint, not a device-scale target.
Carrier	Nonmagnetic, dimensionally stable plate: quartz, alumina, glass-ceramic, sapphire, or insulated aluminum.
Active ports	Four to twelve piezoelectric or optical ports. Same physical drive/sense port is preferred; tightly co-located transmit/receive pairs are acceptable for a first pass.

Part	Minimum specification
Geometry diagnostic	Optional P-coded layout plus detuned twin. Rectangular plate: active span divided by P-port centroid separation near $P_\star \simeq 1.6309682$. Circular carrier: usable radius divided by drive/read ring radius near $P_\star$.
Optional BiFeO3	Coherent, strain, polarization, or multiferroic layer inside the active mode. The self-read loop is mandatory; the receipt makes the source.
Vertical zoning	Top and bottom readouts must be separable, with independent $S^{\text{can}}_{\text{top}}$ and $S^{\text{can}}_{\text{bottom}}$ estimates.
Electronics	MCU, clock, ADC/readout front end, drive stage, onboard flash or SD logging, power switching, timestamped state logging.
Power	Onboard battery. No power cable during balance measurements.
Sensors	PoC temperature at minimum. Prefer multiple temperatures, accelerometer, magnetometer, battery voltage, electrical draw, and drive monitor.
Shielding	Conductive enclosure or PoC shield tied to a defined static reference before weighing, with no force-bearing ground wire during the run.

For the rectangular first pass, mark the active span and diagnostic port centroids before bonding. A 100 mm active span gives a 61.31 mm centroid separation if the P-coded option is used. An 80 mm span gives 49.05 mm. The detuned twin can use ratio 1.50, about eight percent away from $P_\star$, while keeping mass, power, electronics, firmware, handling, and logging matched.

The dummy should be difficult for ordinary physics to distinguish from the active PoC. It should match mass, center of mass, surface coating, emissivity, thermal mass, battery state-of-charge window, electrical draw, shielding, internal wiring geometry, and state schedule. Its coherent branch can be broken by resistive loads, phase-scrambled drive, mechanically damped transducers, or record-shuffled firmware.

The active PoC's first deliverable is a signed and repeatable scalar receipt with top, bottom, sum, difference, raw traces, receipt JSON, and verifier replay. This source-only milestone does not establish repair charge. A force run additionally needs an independent $q_\star$ calibration and a measured or generated repair field.

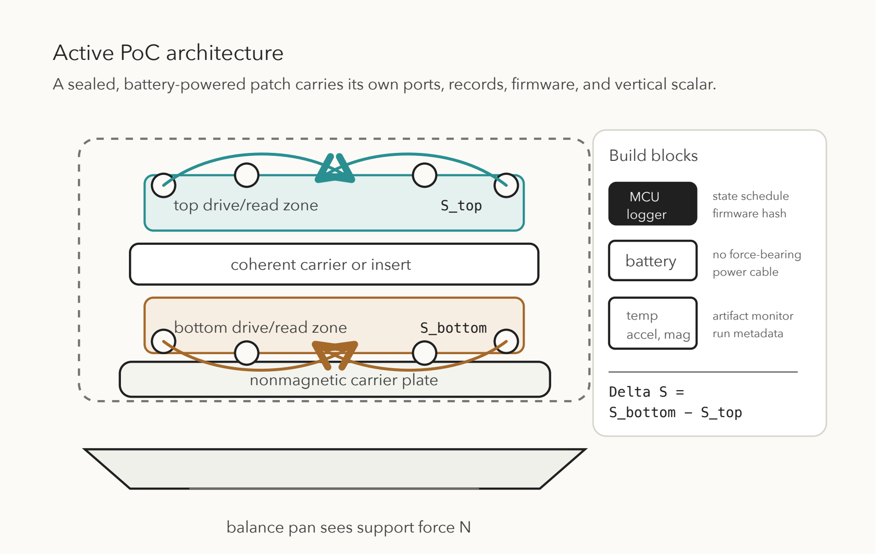

Figure 3: Active PoC architecture with top and bottom drive/read zones, coherent carrier, onboard logging, battery power, sensors, shielding, and balance pan.

Lab move	Theory link	Result tested
Same-port or co-located TX/RX	Sets the self-read gate.	The patch observes its own boundary state.
P-coded and detuned layouts	Tests a geometry hypothesis.	The boundary geometry is declared before force data.
Top and bottom port zones	Defines scalar sum and vertical difference.	The patch separates candidate monopole and dipole source coordinates.
Onboard logger	Supplies R_U evidence.	The state survives as a re-readable record.
Predictive firmware test	Supplies P_U evidence.	Real records constrain subsequent boundary behavior.
Checkpoint replay	Tests continuation within declared error.	The patch keeps the same operational identity across the block.
Battery-only weighing	Removes a mechanical side path.	The support-force record stays clear of tether artifacts.
Dummy PoC	Separates the self-read source from heat and EM artifacts.	The control carries ordinary disturbances without the OPH scalar.

Measuring the Force

The balance is almost disappointingly ordinary. A 0.1 mg analytical balance is ideal for the first run. A 1 mg balance can perform a coarse search if the estimated signal is large enough. The apparatus must sit on a stone slab or anti-vibration table, with the draft shield closed and environmental logs running.

The balance measures support force. A lighter reading means the pan supplies less upward force to hold the object in place. A formal zero reading would mean the pan supplies none. That limiting case is beyond the first goal. The PoC keeps inertial mass. The local test is whether the support-force reading tracks the signed scalar receipt.

In an action-complete exploit model, the scale reads the remaining support force supplied by the pan:

$$N = Mg - F_\chi.$$

The display follows N, the local support force. Active states may change the magnitude or spatial orientation of the source. Force-sign reversal requires a derived signed source factor or a controlled reversal of the external repair gradient.

The PoC must be self-contained during weighing, with no power cable, USB cable, or dangling ground lead that quietly becomes a spring. The PoC runs from its onboard battery and writes to internal memory. External communication waits until the block is complete.

The primary comparison is always within the same object. The active PoC in $ACTIVE+$ is compared against the same active PoC in $SHAM$, with matched average power and matched timing. The dummy PoC is a separate artifact-control object. It runs the same labels and heat schedule and lacks the valid self-reading mode.

The basic ABBA estimator handles slow drift. Put the sham state on both sides of the active state, average the matching ends, and slow balance creep loses most of its vote:

$$\Delta m_X = \mathsf{mean}(X_1, X_2) - \mathsf{mean}(SHAM_1, SHAM_2).$$

The stable window of each state is used after discarding the preregistered settling interval. The ABBA shape cancels slow linear drift. A stronger analysis can fit every sample with state indicators, drift, temperature, temperature derivative, pressure, humidity, and drive covariates. The ABBA number stays the headline comparison because it is simple enough to audit.

The residual support force is computed from the balance result:

$$F_{\mathsf{res}} = -g\,\Delta m_{\mathsf{apparent}}.$$

The OPH scalar cannot be back-solved from this force. It is measured independently from the pre-balance self-read records. The rotor completion maps that source to integrated repair charge:

$$Q_R^{\mathsf{dev}} = q_\star \chi_\nu^{\mathsf{can}} \int_\Omega S_{\mathsf{coh}}^{\mathsf{can}}\, \mathsf{d}^3 x.$$

With an independently established external repair gradient, the conditional force is

$$F_i^{\mathsf{dev}} \simeq -Q_R^{\mathsf{dev}} \partial_i \theta_{\mathsf{ext}}.$$

The experiment therefore needs three independently established objects: the scalar receipt, the dimensional calibration $q_\star$, and the ambient or driven repair field. A nonzero comparison with F_{res} then tests the rotor completion. A weight change that tracks input power, temperature, battery state, acoustic vibration, firmware schedule, or static handling is an ordinary artifact.

The engineering chart may use a different normalization:

$$\chi_\nu^{\mathsf{eng}} \Delta S_{\mathsf{eng}} = \chi_\nu^{\mathsf{can}} \Delta S_{\mathsf{can}}.$$

The balance cannot tell which chart label the analyst chose. The scalar receipt fixes the chart independently; the balance supplies a separate force observable.

The retired planar chart does not size the rotor experiment. Sensitivity is set by the preregistered product

$$q_\star \chi_\nu^{\mathsf{can}} \left| \int_\Omega S_{\mathsf{coh}}^{\mathsf{can}} \, \mathsf{d}^3 x \right| |\partial_z \theta_{\mathsf{ext}}| \,,$$

or by the measured repair-field momentum flux for a driven neutral source.

Lab move	Theory link	Result tested
Same-object ABBA	The scalar belongs to a state of one PoC.	The comparison subtracts drift without swapping patch identity.
$ACTIVE+$ versus $SHAM$	A completed force term must track coherence over power.	The scalar is present in one state and absent in matched heat.
$ACTIVE-$	The orientation of $\Delta S_{\mathsf{coh}}^{\mathsf{can}}$ is controllable.	The scalar dipole is reversed; monopole reversal is a separate source-map receipt.
Physical flip	The measured repair gradient supplies the relevant external direction.	The same internal state changes orientation relative to the field geometry.
Independent ΔS measurement	The scalar cannot be inferred from the force under test.	The observed residual is compared with the pre-balance receipt.

Everything That Can Fool You

A balance is a sensitive instrument for measuring forces, including forces nobody meant to create. The first lift experiment will live or die by how aggressively it attacks mundane explanations.

Most fake lift enters through side doors. Warm air pushes. Static charge tugs. A cable becomes a spring. A screw remembers it is steel at the worst possible time. The artifact table is the exploit developer's threat model for the bench.

Artifact	Mechanism	Control
Air currents and buoyancy	Heating changes local air density or drives convection inside the draft shield.	Closed shield, thermal equilibrium, same-power dummy, heater-only run, chamber temperature log.
Thermal radiation	Asymmetric heating changes radiative exchange with the pan, shield, or enclosure.	Matched emissivity, surface shield, IR check before and after blocks, regression against temperature and dT/dt.
Electrostatics	Charged surfaces attract the pan, enclosure, or nearby objects.	Discharge protocol, Faraday enclosure, consistent handling, optional surface-potential measurement.
Magnetics	Currents, magnets, steel screws, or tools couple to the balance environment.	Nonmagnetic fixtures, magnetometer log, rotation/inversion tests, no ferromagnetic tools near the balance.
Cable forces	A cable supplies a hidden mechanical path.	Onboard battery and onboard logging. No external cables during weighing.

Artifact	Mechanism	Control
Acoustic leakage	The active mode shakes the air, pan, or balance structure.	Sealed enclosure, accelerometer or microphone log, phase-scrambled same-power state.
Vibration and balance coupling	Mechanical drive couples through the pan or table.	Anti-vibration support, accelerometer log, canceled-contrast drive tests.
RF and EMI	Electronics couple into the balance readout or nearby instrumentation.	Internal shielding, dummy electronics, spectrum check if available, no uncontrolled external RF trigger.
Center-of-mass shifts	Moving parts change load distribution on the pan.	Solid-state switching, no moving relays, pan-position controls, orientation checks.
Human handling	State labels, insertion order, and expectation bias leak into the run.	Preregistered state schedule, blind labels when possible, locked analysis script.

The self-read evidence can also fool you. These are software-and-semantics artifacts. Ordinary force artifacts sit in the table above.

Receipt failure	Mechanism	Control
Scalar back-fitting	The estimator is tuned after seeing balance data.	Freeze estimator, schema, and verifier before balance runs.
Label leakage	State names leak into exclusion windows or feature choices.	Blind labels where possible; preregister allowed exclusions.
Shuffled-record pass	Fake records predict as well as real records.	Require P_U margin over shuffled-record controls.
Dummy record pass	The dummy produces comparable R_U, P_U, or C_U.	Treat as failed source discrimination. A positive force result needs active/dummy separation.
Semantic-ID leak	Run identity depends on timestamps, retries, worker IDs, or queue metadata.	Define semantic run IDs independent of executor metadata unless declared physical input.
Power proxy	The force follows heat, vibration, voltage, or firmware schedule.	Regression, same-power sham, phase-scrambled drive, and dummy tests must separate power from $\Delta S^{\mathrm{can}}_{\mathrm{coh}}$.

The artifact program should be written before the first data point. Allowed exclusions, settling windows, thermal thresholds, dummy thresholds, receipt thresholds, semantic-ID rules, and significance criteria be-long in the run manifest. A positive result that needs a friendly analyst is artifact-shaped until the controls say otherwise.

Every artifact control has the same theory purpose: remove ordinary force paths and record-label paths that can mimic a change in N. A candidate action-derived channel may track the independently measured self-read scalar. Heat, charge, air, cable tension, operator timing, timestamp labels, retries, and firmware schedule are forbidden explanatory variables for a claimed signal.

The Protocol

The first credible force test uses a self-contained active PoC with its coherence source, dimensional repair-charge calibration, and external repair field established before the balance data are interpreted. The proposed rotor action predicts the sign and calibration of any apparent weight change. The run produces an evidence bundle: manifests, calibration records, raw traces, state schedule, pre-test scalar, repair-charge and field receipts, balance CSV, environmental data, dummy runs, heater-only runs, firmware hashes, receipt JSON, verifier code, exact command lines, and frozen analysis output.

The dummy PoC serves as an artifact witness. The direct mass baseline for the active PoC comes from state comparisons inside the same physical object, because different objects have different true masses, centers of mass, coatings, and handling histories. The dummy repeats the same schedule to catch heat, electrical, handling, environmental, and record-label tricks.

The protocol is written like an exploit test. Establish the source, trigger it, reverse it, rotate it, and run a matched control object through the same disturbance field. A crash that happens once is gossip. A source that follows its sign, survives rotation, refuses to appear in the dummy, and replays from the public bundle begins to look like control.

Pre-Test: Prove Self-Read

Before weighing, the active PoC must produce a self-read receipt. Weight alone cannot establish the source. The PoC has to hand over its own transcript first: ports driven, ports read, records stored, predictions made, checkpoints replayed, and top/bottom scalar signed.

Receipt	Measurement	Pass criterion
Geometry declaration	Photograph and measure the active span, port centroids, tolerances, and detuned twin ratio before bonding or sealing.	Geometry variable is declared before force data; the detuned twin is measured on the same ratio.
Coupling matrix	Drive each port or zone and read every port or zone. Save amplitude/phase or ringdown features.	Matrix is repeatable and differs from dummy or shuffled controls.
Same-port readback	Drive then sense through the same port, or through a declared co-located pair.	Readback changes predictably with drive state and geometry.
Record stability R_U	Repeat the same state many times and compare extracted records.	Within preregistered tolerance, with out-of-band runs logged.
Predictive boundary P_U	Use records from cycle t to predict held-out readouts in subsequent cycles.	Prediction beats shuffled records and dummy PoC by a preregistered margin.
Visible coherence C_U	Compute mismatch/coherence from port data, ringdown, or phase locking.	Nonzero, repeatable, and state-dependent.
Checkpoint continuation	Save a checkpoint and replay or predict subsequent observable behavior.	Continuation stays within declared error.
Top/bottom scalar	Estimate $S^{\text{can}}_{\text{top}}$ and $S^{\text{can}}_{\text{bottom}}$.	$\Delta S^{\text{can}}_{\text{coh}}$ has known sign in $ACTIVE+$ and reverses in $ACTIVE-$.
Integrated scalar	Integrate the declared source coordinate over the full active region.	The device repair-monopole receipt is separated from its top/bottom dipole.
Repair calibration	Establish or bound $q_\star$ without using the balance residual under test.	Scalar units map to repair-charge units independently.
External repair field	Measure or generate $\partial_i\theta_{\text{ext}}$, or measure outgoing repair-field momentum flux.	The force magnitude and direction have a noncircular field receipt.
Receipt JSON	Produce machine-readable fields for gates, scalars, signs, controls, and hashes.	Independent verifier can recompute pass/fail from raw traces.

Run States

State	Meaning	Required match
OFF	Electronics asleep except minimal logger if needed.	Baseline mass and drift.

State	Meaning	Required match
$SHAM$	Same average power as active mode, dissipated through incoherent or phase-scrambled drive.	Heat, electrical draw, RF envelope, and battery load.
$ACTIVE+$	Self-reading coherent mode with preregistered integrated source and dipole orientation.	Power matched to $SHAM$.
$ACTIVE-$	Same power, reversed phase, handedness, or zoning.	Power matched to $ACTIVE+$, opposite dipole orientation. Monopole sign need not reverse.
$FLIP$	Same active PoC physically inverted and rerun.	The force sign follows the measured repair-field geometry, not a presumed gravity alignment.
$DUMMY$	Dummy PoC executes the labeled scripts without valid self-read.	Thermal and EM artifacts without the lift source.

Evidence Bundle

The public bundle must contain:

- source and firmware commit hashes;
- firmware build environment;
- hardware manifest and geometry manifest;
- balance calibration record and internal readout calibration records;
- raw balance, environmental, power, temperature, vibration, and port traces;
- reduced traces and receipt JSON for R_U, P_U, C_U, self-read gate, top scalar, bottom scalar, commanded sign, flip state, and dummy state;
- verifier code, verifier hash, exact command line, and output;
- analysis script hash and frozen decision thresholds;
- semantic run-ID rule, independent of timestamps, worker IDs, retries, and queue metadata unless those are declared physical inputs.

Measurement Sequence

1. Preregister the run: active PoC ID, geometry declaration, detuned twin ID, dummy PoC ID, firmware hash, verifier hash, receipt schema hash, balance model, state durations, discard window, analysis formula, decision criteria, semantic-ID rule, and allowed exclusions.

2. Calibrate the balance with known masses. Record zero drift and repeatability with an inert object near PoC mass.
3. Calibrate the internal readout chain and save the calibration files.
4. Thermally equilibrate the active PoC, dummy PoC, and balance chamber.
5. Run the pre-test self-read receipt and freeze the receipt output before weighing.
6. Insert the active PoC, close the draft shield, and record OFF.
7. Run $ACTIVE+$ versus $SHAM$ in ABBA order inside the same physical object.
8. Run $ACTIVE-$ versus $SHAM$ in ABBA order.
9. Remove, invert, and rerun the active PoC. The sign should follow the preregistered transformation relative to the measured repair gradient.
10. Repeat the same schedule with the dummy PoC.
11. Run heater-only or resistor-only controls at the same power envelope.
12. Export the full evidence bundle and run the frozen verifier and analysis script.

A candidate effect requires the preregistered signed operation, either a derived signed source factor or controlled external-field reversal, the field-geometry transformation, dummy rejection, artifact rejection, scaling with independently measured $q_\star \chi_\nu^{\mathrm{can}} \int S_{\mathrm{coh}}^{\mathrm{can}} \mathrm{d}^3x$ and external repair gradient, independent verifier replay, full-boundary accounting, and closed momentum and energy ledgers. Anything less is a development log or an apparatus residual.

Protocol step	Theory reason	Result tested
Geometry declaration	The hardware hypothesis is fixed before force data.	The detuned twin can test geometry dependence.
Pre-test self-read	The scalar vanishes without the gate.	The patch has a valid source coordinate for the action-completion test.
$ACTIVE+$ block	A commanded bottom/top scalar has a predicted sign.	The PoC creates the vertical asymmetry.
$ACTIVE-$ block	The sign belongs to the scalar.	The scalar is inverted.
$FLIP$ block	The repair-field direction is external to the PoC.	The same internal state is tested against the measured field orientation.
$DUMMY$ block	Heat, EM behavior, and record-label effects need a control twin.	Ordinary disturbances are separated from the self-read source.
Evidence bundle	OPH hardware claims are record claims.	The run becomes an auditable public record.

Outcomes and Decision Rules

The decision rules are written before the first persuasive number appears. The experiment needs fixed rules for bad receipt, no lift effect, ordinary artifact, and candidate lift.

Outcome	Interpretation
No self-read receipt	Engineering failure. No chi-nu bound follows because the source failed its gates.
Self-read receipt with scalar failing shuffled-record or dummy controls	Estimator failure. Improve the receipt before weighing again.
Accepted scalar, repair-charge, and external-field receipts with no detected force residual	The run bounds the tested rotor-force product for that build. It does not bound the finite channel coefficient by itself.
Force-like signal, missing sign reversal	Insufficient. Most likely ordinary coupling or uncontrolled artifact.
Force-like signal with sign reversal and failed flip or dummy checks	Artifact until proven otherwise.
Force-like signal, independent rotor receipt match, sign reversal, field-geometry reversal, quiet dummy, artifact controls, verifier replay, boundary closure, and conserved momentum ledger	Candidate evidence for the repair-charge rotor completion. Proceed to independent replication.

A lift claim has to follow a derived signed source operation or a controlled external-field reversal and the preregistered transformation under physical flip, vanish in the dummy, resist thermal and EM controls, scale with the independently measured rotor source and external field, replay from the evidence bundle, survive full-boundary accounting, and close the momentum ledger.

If the active PoC produces complete scalar, calibration, and field receipts and the balance sees no residual, the experiment narrows the tested rotor-force product. A scalar-only receipt is insufficient for that bound.

A positive run starts adversarial replication. Change the balance, operator, shielding, state order, and PoC geometry. Change the lab. Run reduced-pressure tests if feasible, with deliberate thermal gradients, deliberate static perturbations, and deliberate phase-scrambled high-power states. Make the effect survive being hunted.

Build Roadmap

The first build should avoid heroic materials. A battery-powered piezo plate is a clean first PoC because the system can drive, read, log, checkpoint, and predict through declared ports. BiFeO3 can appear as a coherent insert inside the same drive/read discipline.

The roadmap is staged like exploit development. A shell comes after a crash, a reliable control comes after a noisy crash, and a payload comes after the control survives hostile handling. Here the payload is the balance run. The controlled variable is the signed self-read contrast.

Milestone 1: Instrumented PoC

- Build a nonmagnetic plate with four or eight same-port piezo discs, separated into top and bottom readout zones.
- If using the P-coded option, encode $P_\star \simeq 1.6309682$ in the port/readback geometry and build a detuned twin with the same declared ratio shifted by at least five percent.
- Add onboard MCU, ADC front end, drive stage, battery, flash or SD logging, temperature sensor, accelerometer, magnetometer, and battery monitor.
- Seal or shield the PoC so the weighing state has no external cables.
- Write firmware that alternates drive and read windows, records raw port data, stamps every state transition, and produces a receipt JSON skeleton.

Exit receipt: measured geometry, detuned twin geometry if used, reproducible coupling matrices, stable logs, same-port or co-located readback, and firmware/source hashes.

Milestone 2: Coherence Scalar

- Define the feature extractor for ringdown, phase, or coupling data.

- Preregister R_U, P_U, and C_U estimators.
- Demonstrate predictive boundary performance against shuffled records and dummy records.
- Demonstrate checkpoint continuation within declared error.
- Estimate top and bottom canonical scalars separately, including their sum and difference.
- Produce $ACTIVE+$ and $ACTIVE-$ states with opposite scalar-dipole orientations. Claim monopole reversal only if a signed source factor is separately derived.

Exit receipt: signed and repeatable coherence contrast, raw logs, receipt JSON, frozen verifier, and exact command line.

Milestone 3: Artifact Twin

- Build a dummy PoC with matched mass, outline, center of mass, coating, emissivity, thermal mass, battery, shielding, and electronics envelope.
- Match power schedules and time-dependent heat release.
- Break the self-reading coherent mode through resistive loads, damping, phase scrambling, or record shuffling.
- Confirm that the dummy fails the self-read scalar gates.

Exit receipt: dummy reproduces ordinary thermal and EM signatures and lacks the self-read scalar.

Milestone 4: Balance Candidate

- Run the full ABBA sequence for $ACTIVE+$, $ACTIVE-$, $FLIP$, $SHAM$, and $DUMMY$.
- Store balance CSV, PoC logs, environmental logs, raw port traces, calibration files, photos, hashes, receipt JSON, verifier output, and analysis output in one evidence bundle.
- Treat the first successful run as a candidate only after sign, flip, dummy, artifact controls, and verifier replay pass.
- Treat a null with accepted scalar, repair-charge calibration, and external-field receipt as a bound on the tested rotor product.

Exit receipt: candidate rotor-force run or a public bound backed by complete scalar, calibration, and external-field receipts.

Milestone 5: Replication

- Repeat with a different balance and operator.

- Repeat with altered state order and blind labels.
- Repeat with reduced pressure or a better-controlled thermal chamber if possible.
- Repeat with a second PoC geometry that changes P detuning if used, integrated scalar source, or orientation relative to the measured repair gradient.
- Compare against the preregistered rotor product $q_\star \chi_\nu Q_S \partial_z \theta_{\text{ext}}$, with $Q_S = \int S_{\text{coh}}^{\text{can}} \mathrm{d}^3 x$.

Exit receipt: scaling tied to measured $\Delta S_{\text{coh}}^{\text{can}}$, with operator, heat, power, accidental geometry, semantic run ID, and handling routine checked as artifact variables.

Large-area or hoverboard-class builds wait for a small PoC with validated scalar, calibration, field, and conservation receipts and either a candidate rotor-force run or a public bound that an independent verifier can replay.

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