The O of système-O

Title

Système-O : Substituting Mass with a Count of Existences

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Abstract

This manuscript introduces Système-O, a minimal operational ontology that replaces mass with a countable elementary unit O. Physical quantities are expressed as the integer count No of O so that Q_O = N_O * O. We state the axioms, provide a reproducible measurement protocol to obtain and record No, define rounding and uncertainty rules, and validate additivity and invariance through simple tests and examples. Conversions to conventional human units are confined to an appendix as a strictly conventional bridge. Système-O aims to enable direct micro–macro comparisons without treating mass as a primitive and to offer a practical framework for empirical testing and methodological standardization.

Keywords

ontology; elementary unit; integrality; counting; micro–macro; Système-O

1 Introduction

Motivation

Standard physical practice treats mass as a primitive scalar. This practice mixes ontological and operational commitments and complicates direct comparisons between microscopic and macroscopic regimes. The present work proposes an alternative: adopt a single elementary unit of existence O and treat physically relevant scalars as integer counts NO of O. This move separates ontological primitives from human conventions and yields a simple arithmetic framework for scale bridging.

Scope

We present the axiomatic core of Système-O, an operational method to obtain NO from measurements, discrete assembly rules, minimal validation tests, and practical appendices (conversion bridge, data templates, submission materials). The manuscript is written for a readership in foundations and measurement theory; experimental protocols are intentionally simple and reproducible.

2 Axioms and Elementary table

Symbol	Name	Definition
O	Elementary unit	Elementary indivisible unit of existence (1 O)
Q_o	Quantity of existence	Q_o = N_O * O with N_O in N
O_s	Osilo scale	Human convenience scale: 1 O_s = 10^12 O
kg	Kilogram reference	Conventional human unit; see Appendix A

Axioms

- **Axiom 1 Unitary ontology:** O is the elementary, indivisible unit of existence.
- **Axiom 2 Integrality:** Every physically relevant scalar is an integer NO of O.
- **Axiom 3 Human scale:** O_s is a conventional multiple of O fixed at 10^12.
- **Axiom 4 External conventions:** Conventional units (kg, litre, etc.) are external references and do not appear in the ontological core.

Operational rules

Operational rules

Allowed operations are integer addition, integer subtraction with nonnegative result, integer multiplication, integer division with floor, and

comparisons. Fractions of O are ontologically meaningless. For nonoverlapping assemblies, additivity holds: NOtotal=ΣNOcomponent. Spatial rearrangement preserves NO.

3 Methodology

Objective

Provide a reproducible protocol to obtain, record, and validate NO values for objects and assemblies across scales.

Standard procedure

1. **Define sample and protocol:** specify object identity, measurement method, instrument model, resolution, and environmental conditions.
2. **Acquire primary measurement:** record instrument reading in its native units. Do not introduce mass as a primitive in the main text.
3. **Translate to NO:** if the instrument yields NO directly, adopt it; otherwise use the conversion bridge in Appendix A and record conversion provenance.
4. **Check integrality:** for converted value x, if $x \in \mathbb{N}$ set NO=x; otherwise compute N~O=round(x) and residual ΔNO=x−N~O.

5. **Controls:** repeat measurements, use independent methods where possible, and run additivity tests on components.
6. **Record metadata:** store NO, NOs if used, instrument uncertainty Uinstr expressed in O, ΔNO, conversion provenance, and environmental conditions.

Rounding and uncertainty rules

- **Rounding rule:** $N_{\sim O} = \mathrm{round}(x)$.
- **Residual:** $\Delta NO = x - N_{\sim O}$ recorded in O.
- **Thresholds:** if $|\Delta NO| \le U_{instr}$ treat rounding as noncritical; if $|\Delta NO| > U_{instr}$ improve precision or aggregate repeated measures and round the mean.
- **Aggregation:** for repeated measures x_i, compute $\bar{x}$ and σ in O; set $N_{\sim O} = \mathrm{round}(\bar{x})$ and report σ and $\Delta NO = \bar{x} - N_{\sim O}$.

Data recording template (Appendix B provides ready forms)

Record Sample ID, instrument and method, primary reading, conversion used, converted value x in O, rounded value N~O, residual ΔNO, instrument uncertainty Uinstr, decision and comments.

4 Discrete assembly rules and minimal tests

Assembly primitives

- **Alignment:** linear concatenation of O units; total count equals the sum of aligned units.
- **Paving:** discrete tiling to form surfaces; surface count is the discrete product of counts along orthogonal directions.
- **Stacking:** layered stacking to form volumes; total count is the sum of layers.

Minimal validation tests

- **Test Integrality:** convert a representative sample (particle proxy, grain, small object, 1 kg reference) to O and compute Delta_N_O. Success criterion: at least 90 percent of conversions satisfy abs(Delta_N_O) <= U_instr.
- **Test Additivity:** measure components A, B, C and assembled object T; verify N_O_tilde_T = N_O_tilde_A + N_O_tilde_B + N_O_tilde_C within documented residuals.
- **Test Invariance:** rearrange the assembly (paving, stacking) and verify N_O is unchanged.

Representative numerical examples (for illustration only)

Case	Value_in_O	Value_in_O_s	Notes
Reference 1 Os	10^12 O	1 O_s	Human-scale reference

1 kg conventional	10^36 O	10^24 O_s	Conventional unit (external)
Example object A	4.237 * 10^24 O	4.237 * 10^12 O_s	Illustrative only
Components B C D	10^12 O, 2 * 10^12 O, 3 * 10^12 O	1 O_s, 2 O_s, 3 O_s	Three components

5 Discussion and conclusion

Advantages

Système-O provides ontological clarity by reducing primitives to a single countable unit, enforces integrality that simplifies micro–macro comparisons, and makes rounding and uncertainty explicit in the same unit as the quantity.

Limitations

Communicating results in conventional units requires a conversion bridge and may face resistance. Integer counts of O can be numerically large, raising storage and computational considerations. Instruments produce real-valued outputs; community agreement on rounding and aggregation protocols is necessary.

Outlook

Develop open-source tools for conversion and record keeping, run pilot experimental studies to test practical

utility, and pursue philosophical analysis of measurement implications.

Conclusion

Système-O reframes physical quantity by counting elementary existences rather than invoking mass as a primitive. The framework is operational, reproducible, and ready for empirical trials under the protocols provided.

Appendix A Passerelle conventionnelle

Placement: This appendix is outside the ontological core and must not be used in axioms or fundamental equations.

Definition: 1 O_s = 10^12 O.

Conventional bridge: 1 kg = (O_s)^3 = 10^36 O.

Conversion rule: For a measurement x in kilograms, N_O = x * 10^36.

Note: This conversion is strictly conventional and external to Système-O.

Appendix B Data templates and example records

Measurement record template

Record A-001

Method: *conventional balance reading*

Primary reading: 0.004237 kg

Conversion used: Appendix A

Converted value x in O: 4.237 * 10^33 O

Rounded value N_O_tilde: 4.237 * 10^33 O

Residual Delta_N_O: 0

Instrument uncertainty U_instr: 1 * 10^29 O

Decision: noncritical

Comments: residual within instrument uncertainty

Record B-010

Method: spectrometric particle proxy

Primary reading: x = 2.3456 * 10^18 O

Conversion used: none (instrument outputs directly in O)

Converted value x in O: 2.3456 * 10^18 O

Rounded value N_O_tilde: 2,345,600,000,000,000 O

Residual Delta_N_O: 0

Instrument uncertainty U_instr: 5 * 10^14 O

Decision: noncritical

Comments: rounded to nearest integer

Record C-100

Method: assembly of three components measured separately

Primary readings:

- comp1: 1.0 * 10^-12 kg
- comp2: 2.0 * 10^-12 kg
- comp3: 3.0 * 10^-12 kg

Converted values in O:

- comp1: 1.0 * 10^24 O
- comp2: 2.0 * 10^24 O
- comp3: 3.0 * 10^24 O

Rounded values: identical to converted values

Residuals: 0

Instrument uncertainty U_instr: 1 * 10^20 O

Additivity: confirmed

Total: 6.0 * 10^24 O

Appendix C Submission materials

Short abstract 100–150 words

Système-O introduces a minimal operational ontology that replaces mass with a countable elementary unit O. Physical quantities are expressed as the integer count NO of O, so that $Q_O = NO \cdot O$. The manuscript states axioms, provides a reproducible measurement protocol to obtain and record NO, defines rounding and uncertainty rules, and validates additivity and invariance through simple tests and examples. Conversions to conventional units are confined to an appendix as a purely conventional bridge. Système-O aims to enable direct micro–macro comparisons without treating mass as a primitive and to offer a practical framework for empirical testing and methodological standardization.