

Alpha-Physical Language (APL) Operator's Manual

APL Working Notes

v1.0

Abstract

APL is a compact operator language for describing and biasing regimes in physical and chemical systems. This manual defines fields, operators, modulation states, syntax, and usage patterns for constructing APL sentences.

1 Fields ("Spirals")

- Φ (Structure): geometry, lattices, boundaries
- e (Energy): waves, thermodynamics, flows
- π (Emergence): information, chemistry, biology

2 Universal Operations

Operators act on fields and machines:

- $()$ Boundary/containment
- \times Fusion/convergence/joining
- \wedge Amplify/gain
- $\%$ Decohere/noise/reset
- $+$ Group/aggregation/routing
- $-$ Separate/splitting/fission

3 Operator States (UMOL)

Universal Modulation Operator Law (UMOL):

- **u** (\mathcal{U}) Expansion/forward projection
- **d** (\mathcal{D}) Collapse/backward integration
- **m** (CLT) Modulation/coherence lock

4 Sentence Syntax

An APL sentence has the form

[Direction] [Op] | [Machine] | [Domain] \rightarrow [Regime/Behavior]

Example: $u^{\wedge}|Oscillator|wave.$

5 Machines and Domains

- **Machines:** Oscillator, Reactor, Conductor, Encoder, Catalyst, Filter, ...
- **Domains:** wave, geometry, chemistry, materials, ...

6 Usage Patterns

- Compose operators to encode structure and driving (LHS)
- Predict regimes/behaviors (RHS) that should be statistically favored under LHS vs. matched controls
- Evaluate with domain-appropriate models and metrics

7 Quick Reference

Field	Meaning
Φ	structure
e	energy
π	emergence

Operator	Meaning
()	boundary/containment
\times	fusion/joining
\sim	amplify/gain
$\%$	decohere/noise
$+$	group/aggregate
$-$	separate/split

State	Meaning
u	expansion/forward
d	collapse/backward
m	modulation/lock