

## Unification in Context

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### Core features of our universe:

scale invariance

causality

impedance of space, 377 Ohms,  $Z_0$

I elasticity of time,  $[x]$  N/s,  $Y_0$

M unit of energy, photon, spin  $\hbar$

B unit of charge, electron, spin  $\hbar/2$ , charge -1

U unit nucleon, proton, spin  $\hbar/2$ , charge +1

E unit nucleon, neutron, spin  $\hbar/2$ , charge 0

D nuclear shim, neutrino, spin  $\hbar/2$ , charge 0

force: mediator(s)

electroweak: virtual photon, intermediate vector boson

gravistrong: temporal elasticity,  $E_f 2.05 \cdot 10^{-7} \cdot E_0$

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### equivalence:

$E_{in} = E_{out}$ , conservation

$E = mc^2 = h \cdot \nu$ , energy mass photon-momentum equivalence

$F = ma$ , Newton's second law

$\nabla \times E = dB/dt$ , curl(E) is rate-of-change(B)

D entropy:

E  $\Delta(S(t)) > 0$ , change of entropy of a system over

R time is always positive

I logic:

V Gödel's incompleteness, logic cannot assert its own

A consistency

B probability:

L  $P(\text{unlikely event} | t \rightarrow \text{infinity}) \rightarrow 1$ , Murphy's law

E math:

Green's theorem, boundary integral is region contained

Cauchy-Schwarz inequality, magnitude(inner product) is

bounded by the product of the norms

### miscellaneous:

Navier-Stokes equations, fluid mechanics

impulse response, linear systems theory