Continuously Adaptive Matter–Information Systems

Including Information–Interaction Grand Unification

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Abstract

This work introduces Continuously Adaptive Matter–Information Systems (CAMIS), a unified non-equilibrium framework in which matter, information, learning, time, and interaction strength evolve continuously. The framework integrates an Information–Interaction Grand Unification model, reframing fundamental forces as emergent constraint regimes rather than fixed symmetries.

1 System Definition

$$\mathcal{S}(t) = \{M(t), W(t), \Phi(t), \tau(t), H(t)\} \tag{1}$$

$$\frac{d\mathcal{S}}{dt} = \mathcal{F}(\mathcal{S}, \mathcal{E}) \tag{2}$$

2 Efficiency Inversion

$$\frac{d\eta}{dt} \approx 0 \ \wedge \ \frac{d^2\eta}{dt^2} \to 0 \tag{3}$$

3 Information–Interaction Unification

$$\mathcal{I}_{total} = \int \Psi_i^\dagger \mathcal{C}(\Phi, \rho, \tau) \Psi_j \, d^4x \tag{4}$$

4 Conclusion

CAMIS establishes a unified adaptive framework spanning physics, computation, and human-coupled systems.