

Why Canonical Inflation Passes and Horizon-Only Models Do Not

The contrast between canonical inflationary models and horizon- or entropy-based proposals under CEDA is not a matter of preference, tradition, or empirical success. It follows directly from differences in **explanatory structure** once conservation-honest bookkeeping and coarse-graining discipline are enforced.

This section clarifies that contrast.

1. Where Acceleration Is Located

In canonical single-field slow-roll inflation, accelerated expansion is sourced by **explicit dynamical degrees of freedom**. Negative pressure arises directly from the stress–energy tensor of a scalar field whose potential energy dominates during a slow-roll phase. The location of the effect is unambiguous: it resides in the intrinsic dynamics of the field sector and enters the Einstein equations through a well-defined $T_{\mu\nu}T_{\{\mu\nu\}}T^{\mu\nu}$.

By contrast, horizon-only or entropy-driven proposals do not localize negative pressure in any intrinsic dynamical degree of freedom. Acceleration is instead attributed to changes in accessibility, horizon growth, entropy increase, or coarse-grained bookkeeping. When these constructions are translated into conservation-honest form, any apparent acceleration can be traced to repartitioning of existing degrees of freedom rather than to new dynamics.

CEDA credits only the former. Effects must be **located**, not narrated.

2. Conservation Accounting and Exchange Terms

Inflationary models pass conservation accounting cleanly. Energy–momentum conservation is enforced covariantly, with no exchange terms introduced between sectors during the inflationary phase. No horizon-sourced energy, phenomenological closure terms, or implicit regulators are required to sustain accelerated expansion.

Horizon-only models fail at this step. To maintain inflation-like behavior, they must either:

- introduce implicit exchange terms not derivable from declared partitions, or
- rely on bookkeeping choices that effectively inject or remove energy without physical sourcing.

Under CEDA, such moves are classified as **descriptive reweighting**, not mechanism.

3. Stability Under Admissible Coarse-Graining

Canonical inflation remains stable under admissible variations in coarse-graining, horizon definition, and equivalent reformulations. Modest changes in the background–perturbation split or frame choice do not eliminate the inflationary phase or require retuning. This stability signals genuine dynamical structure.

Horizon-based proposals exhibit the opposite behavior. Inflation-like effects typically depend on privileged slicing, specific horizon definitions, or finely chosen partitions. When these choices are varied within admissible bounds, the claimed acceleration either disappears or becomes order-unity unstable.

CEDA treats such fragility as diagnostic evidence of **descriptive dependence**, not physical driving.

4. Role of Control Parameters

Slow-roll conditions in inflationary models function as **explicit regime constraints**. They delimit where the effective field theory description applies and where it breaks down. These conditions are declared in advance and enforced symmetrically; they do not “know” the desired outcome, nor do they regulate acceleration by construction.

In contrast, horizon-only models frequently rely on parameters or weighting functions that effectively target a desired equation of state or persistence condition. Even when presented as emergent or informational, such structures behave diagnostically as hidden control functions.

CEDA distinguishes sharply between declared regime control and implicit goal-seeking.

5. Horizon Non-Agency

Inflationary models treat horizons strictly as **causal boundaries**. They regulate correlation and mode evolution but do not act as physical agents, sources of energy, or drivers of expansion. Accelerated expansion persists independently of any horizon bookkeeping.

Horizon-only proposals invert this relationship, assigning causal or energetic agency to horizons themselves. Under CEDA’s causal non-agency rule, this constitutes a category error. Horizons may constrain descriptions; they may not replace dynamics.

6. Conditional Verdict Symmetry

Finally, inflation does not receive unearned extrapolative credit. CEDA endorses inflationary mechanisms **only within the explicitly declared slow-roll EFT regime**. Claims regarding reheating completion, eternal inflation, or global spacetime structure are not audited and are not endorsed.

This same conditional discipline is applied to all proposals. Inflation passes not because it is inflation, but because within its declared regime it satisfies every diagnostic requirement.

Summary

Canonical inflation passes CEDA because it introduces explicit dynamical structure, localizes negative pressure in identifiable degrees of freedom, respects conservation without hidden exchange, remains stable under admissible reformulation, and treats horizons as boundaries rather than agents.

Horizon-only and entropy-driven models fail not because they are unconventional, but because they attempt to generate acceleration through descriptive reclassification rather than through earned dynamics.

The distinction is structural, not sociological.