Dimensional Information Cohesion Spectra (DICS): A Preliminary Framework

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Status: preliminary theoretical framework / hypothesis note

Related repository: https://github.com/Da-P-AIP/DICP-Dimension-Spectrum

Abstract

This note introduces Dimensional Information Cohesion Spectra (DICS) as a preliminary theoretical extension of the Dimensional Information Cohesion Particle (DICP / Da-P particle) framework.

The DICS framework proposes that information cohesion may not be uniform across effective dimensions. Instead, a Da-P / DICP network may exhibit dimension-dependent cohesion modes, residuals, or observable cross-sectional signatures.

This document is not a claim of experimentally confirmed higher dimensions, nor a completed mathematical theory. It is a structured hypothesis framework intended to organize future theoretical work and numerical verification targets.

1. Motivation

The Da-P / DICP framework has developed around the idea that spacetime continuity may emerge from information cohesion between Planck-scale or mesoscopic cells.

Existing Da-P-related work includes:

- POSP-like structural interpretations of propagation limits;
- corrected 3D asymmetric finite-size scaling data;
- candidate susceptibility scaling in corrected DICP simulations;
- the Da-P cosmological constant residual hypothesis.

DICS is introduced to organize a broader question:

```
If information cohesion is fundamental, does its behavior depend on effective dimension?
```

2. Core Definition

A preliminary definition is:

```
DICS is a proposed spectrum of information-cohesion behavior
across effective dimensions, dimensional layers, or projected
```

```
higher-dimensional cohesion modes.
```

In this definition:

- `DICP` refers to local or mesoscopic information cohesion;
- `DICS` refers to the dimension-dependent structure of that cohesion;
- observed lower-dimensional phenomena may represent cross sections, projections, or residuals of a broader cohesion spectrum.

3. Conceptual Layering

The proposed conceptual hierarchy is:

```
Planck-scale information cells
  -> DICP local cohesion
  -> emergent spacetime continuity
  -> dimension-dependent cohesion modes
  -> DICS spectrum
  -> lower-dimensional signatures or residuals
```

This hierarchy is conceptual. Each layer requires further mathematical definition and numerical testing.

4. Dimensional Transparency

Dimensional transparency is the hypothesis that a higher-dimensional information-cohesion structure may be only partially observable through a lower-dimensional slice.

A lower-dimensional observer may not see the full structure directly. Instead, they may observe:

- a residual;
- a projection;
- an anomalous scaling law;
- a weak background tension;
- a change in transition-like behavior;
- a cross-sectional signature.

This is an analogy and hypothesis, not evidence of higher-dimensional physical objects.

5. Higher-Dimensional Cohesion Bodies

A higher-dimensional cohesion body is a hypothetical coherent information-coupled structure whose full state is not contained in a single observed 3D or 4D section.

Possible lower-dimensional signatures could include:

- residual synchronization mismatch;

- finite-size scaling anomalies;
- transition weakening or disappearance across dimension;
- effective projection behavior;
- persistent residuals in large-scale limits.

This concept is a placeholder for future mathematical and numerical tests.

6. Relation to Lambda Residual

The Da-P Cosmological Constant Residual Hypothesis proposes that the cosmological constant `Lambda` may be interpreted as a global residual from imperfect synchronization of a Da-P information-cohesion network.

Published theoretical note:

```
https://doi.org/10.5281/zenodo.20510743
```

Candidate scaling relation:

```
Lambda_DaP * ell_P^2 ~ <(delta C / C)^2>_global ~ (ell_P / L_U)^2
```

In the DICS framework, this may be interpreted as a possible macroscopic residual signature of global information-cohesion mismatch.

This does not mean that the cosmological constant problem has been solved. It means the lambda residual hypothesis can be organized as one DICS-related residual model.

7. Relation to Corrected Numerical Work

The corrected 2025 Da-P / DICP reverification dataset reports candidate susceptibility finite-size scaling:

```
chi_max ~ L^(gamma/nu)
gamma/nu ~= 2.965
R^2 ~= 0.999997
```

Published dataset:

```
https://doi.org/10.5281/zenodo.20510158
```

Prior invalidation record:

```
https://doi.org/10.5281/zenodo.16780090
```

This numerical result does not prove DICS. It provides a corrected numerical reference point for future dimension-dependent verification.

8. Candidate Verification Targets

The DICS framework should eventually connect to measurable quantities in the DICP Verification Platform:

```
https://github.com/Da-P-AIP/DICP-Verification-Platform
```

Possible targets include:

1. Dimension-dependent susceptibility peak behavior.
2. Survival statistics across dimensions.
3. Changes in Binder-like diagnostics.
4. Residual scaling with system size.
5. Transition weakening, disappearance, or stabilization across dimensions.
6. Projection-like toy models between higher-dimensional simulations and lower-dimensional observables.
7. Whether residuals scale as `L^-2` or another law.

9. Minimal Mathematical Placeholders

Let `C_d` denote an effective information-cohesion state at dimension `d`.

A minimal placeholder for a dimension-dependent cohesion spectrum is:

```
S_DICS(d) = Measure[C_d]
```

where `Measure` may later be defined through susceptibility, survival, residual, or correlation observables.

A residual between dimensions may be represented as:

```
Delta C(d1, d2) = C_d2 - P(C_d1 -> d2)
```

where `P` is a projection or comparison operator between effective dimensions.

These are placeholders, not finalized equations.

10. What This Framework Does Not Claim

This note does not claim:

- that higher dimensions have been experimentally observed;
- that Da-P particles have been experimentally confirmed;
- that DICS is a completed mathematical theory;
- that the cosmological constant problem is solved;
- that the corrected 3D finite-size scaling result proves DICS.

Instead, it claims:

```
DICS is a candidate framework for organizing dimension-dependent
information-cohesion hypotheses and defining future verification targets.
```

11. Roadmap

Recommended next steps:

1. Refine DICS terminology.
2. Define a minimal mathematical representation of DICS modes.
3. Connect DICS concepts to DICP Verification Platform observables.
4. Develop toy projection models.
5. Identify which claims can be numerically tested.
6. Prepare a Zenodo-ready DICS v0.1 theoretical note.
7. Reassess whether the DICP-Dimension-Spectrum repository is ready to become public.

12. Suggested Zenodo Description

This theoretical note introduces Dimensional Information Cohesion Spectra (DICS) as a preliminary framework extending the Dimensional Information Cohesion Particle (DICP / Da-P particle) hypothesis.

DICS proposes that information cohesion may exhibit dimension-dependent spectra, modes, residuals, or cross-sectional signatures. The framework is intended to organize hypotheses such as dimensional transparency, higher-dimensional cohesion bodies, and the Da-P cosmological constant residual hypothesis.

This work is presented as a preliminary hypothesis framework, not as a completed theory or experimental confirmation.

13. Suggested Keywords

DICP, DICS, Da-P particle, dimensional information cohesion, dimensional spectrum, dimensional transparency, higher-dimensional cohesion, information cohesion, emergent spacetime, theoretical physics, complex systems

Citation Targets

- Corrected 2025 reverification dataset: https://doi.org/10.5281/zenodo.20510158
- Da-P cosmological constant residual hypothesis: https://doi.org/10.5281/zenodo.20510743
- Main Da-P repository: https://github.com/Da-P-AIP/Da-P_Particle
- DICP Verification Platform: https://github.com/Da-P-AIP/DICP-Verification-Platform