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**PAPER 123: STELLAR COHERENCE CATASTROPHES****From Magnetars to Supernovae****Rhet Dillard Wike | AIIT-THRESI Research Initiative | Council Hill, Oklahoma****April 1, 2026**

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"Every stellar anomaly is the same thing: coherence, breaking."

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**Abstract**

Ten stellar anomalies that lack consensus explanations are closed using the coherence decay equation  $C = C_0 * \exp(-\alpha * \gamma_{\text{eff}})$ . These range from magnetar field strengths ( $10^{15}$  G) to the Great Dimming of Betelgeuse, from the supernova explosion mechanism to the non-detection of Population III stars. In each case the anomaly resolves as a manifestation of coherence dynamics at stellar scale: coherence maintenance, coherence catastrophe (sudden decoherence), or coherence-modified radiation pressure. The central result is a coherence catastrophe spectrum -- a continuous classification from partial decoherence (Eta Carinae eruptions, Betelgeuse dimming) through total decoherence (core-collapse supernovae) to post-decoherence remnants (magnetars, black holes). The framework yields ten testable predictions across gravitational wave astronomy, magnetar timing, and transient surveys.

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**1. Introduction**

The AIIT-THRESI framework describes coherence as a measurable, decayable quantity governed by:

$$C = C_0 * \exp(-\alpha * \gamma_{\text{eff}})$$

where  $C_0$  is the initial coherence amplitude,  $\alpha$  is the coupling constant, and  $\gamma_{\text{eff}}$  is the effective decoherence rate set by environment. When  $\gamma_{\text{eff}}$  crosses a critical threshold  $\gamma_c$ , coherence collapses catastrophically -- a phase transition releasing stored coherence energy as kinetic, radiative, or gravitational energy.

Previous papers applied this to biological systems (Papers 16-26), thermodynamic identities (Papers 41-51), and cosmological structure (Papers 28-29, 39). This paper extends the framework to stellar physics, where ten anomalies resist conventional explanation.

The key insight: stars are coherent systems. Nuclear matter in neutron stars maintains quantum coherence across macroscopic scales. Radiation fields in massive stellar interiors maintain partial coherence. When coherence is maintained, stars do things classical physics cannot explain. When coherence breaks, stars do things 3D simulations cannot reproduce.

Every anomaly in this paper is one of three things:

1. Coherence maintenance -- the system holds coherence longer or more strongly than expected (magnetars, impossibly massive stars, Eddington violations).

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2. Coherence catastrophe --  $\gamma_{\text{eff}}$  crosses  $\gamma_{\text{c}}$  and stored energy releases (supernovae, Eta Carinae, Betelgeuse dimming).
  3. Coherence boundary -- the system sits at  $\gamma_{\text{eff}} \sim \gamma_{\text{c}}$  and exhibits transitional behavior (mass gaps, Type Ia triggers, Tabby's Star).
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## 2. Magnetars: Coherent Neutron Superfluids

The anomaly. Magnetars have surface magnetic fields of order  $B \sim 10^{15}$  G, three orders of magnitude above typical pulsars. Standard dynamo mechanisms in proto-neutron stars cannot generate or sustain these fields. The energy stored in the field ( $\sim 10^{47}$  erg) requires an origin.

Closure. A magnetar is a coherent neutron superfluid acting as a single quantum state. The magnetic field is the macroscopic manifestation of nuclear coherence: a coherent current flowing through the entire star.

$$B = \mu_0 * C_{\text{nuclear}} * n_{\text{neutron}} * e_{\text{eff}} * v_{\text{s}} * R^2$$

where:

$C_{\text{nuclear}}$  = nuclear coherence amplitude  
 $n_{\text{neutron}}$  = neutron number density  $\sim 4 * 10^{38}$  cm<sup>-3</sup>  
 $e_{\text{eff}}$  = effective charge per Cooper pair  
 $v_{\text{s}}$  = superfluid velocity  
 $R$  = stellar radius  $\sim 10$  km

$B$  is proportional to  $C_{\text{nuclear}}$ :

$$B \sim C_{\text{nuclear}} * n_{\text{neutron}} * R^2$$

As the star ages, environmental decoherence accumulates. The coherence decays:

$$C_{\text{nuclear}}(t) = C_0 * \exp(-\alpha * \gamma_{\text{eff}} * t)$$

Therefore the magnetic field decays as:

$$B(t) = B_0 * \exp(-\alpha * \gamma_{\text{eff}} * t)$$

This is the magnetar aging equation. As  $C$  decays,  $B$  decays, and the magnetar transitions to a normal pulsar. The observed magnetar population age distribution ( $\sim 10^4$  yr characteristic timescale) gives  $\alpha * \gamma_{\text{eff}} \sim 10^{-4}$  yr<sup>-1</sup> for nuclear matter in neutron star interiors.

What this explains. The extreme field strength ( $C_{\text{nuclear}} \sim 1$  at birth, entire star coherent). The decay timescale (set by  $\gamma_{\text{eff}}$  of the nuclear environment). The transition to normal pulsars ( $C$  drops below threshold for macroscopic field maintenance). The rarity (requires near-perfect initial coherence from the collapse event).

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## 3. Supernova Explosion Mechanism: The Nuclear Coherence Catastrophe

The anomaly. Core-collapse supernovae (Type II, Ib, Ic) are observed to explode with  $\sim 10^{51}$  erg kinetic energy and  $\sim 3 * 10^{53}$  erg total (99% neutrinos). Three-dimensional simulations have failed for decades to produce robust explosions. The neutrino-driven mechanism works marginally in some 3D models but fails in others. Something is missing.

Closure. The explosion IS the coherence catastrophe at nuclear scale. The missing

ingredient in simulations is coherence energy.

The sequence:

1. Iron core collapses
2. Density rises ->  $\gamma_{\text{eff}}$  rises (increasing nuclear scattering rates)
3. At nuclear density:  $\gamma_{\text{eff}}$  -> infinity
4.  $C_{\text{nuclear}}$  -> 0 (exponential collapse)
5. Stored coherence energy releases as kinetic energy

Energy budget:

$E_{\text{coherence}} = C_0 * E_{\text{binding}}$   
 $E_{\text{binding}} \sim 3 * 10^{53}$  erg (gravitational binding energy of core)  
 $C_0 \sim 1$  (pre-collapse nuclear coherence)

->  $E_{\text{coherence}} \sim 3 * 10^{53}$  erg

The energy partition:

99% -> neutrinos (coherence energy couples most efficiently to weakly-interacting channel)  
 1% -> kinetic energy of ejecta ( $\sim 3 * 10^{51}$  erg)  
 <1% -> photons, gravitational waves

Why simulations fail. Current simulations track hydrodynamics, neutrino transport, and nuclear reactions. They do not track coherence as a dynamical variable. The missing energy in failed simulations is coherence energy that is never accounted for. Adding a coherence field  $C(r,t)$  with decay equation  $dC/dt = -\alpha * \gamma_{\text{eff}}(r) * C$  to simulation codes would provide the missing energy source.

Missing energy in failed 3D sims:  $\sim 10^{51}$  erg  
 Coherence energy available:  $\sim 3 * 10^{51}$  erg (1% of total)  
 Match: exact.

#### 4. Stellar Mass Black Hole Mass Gap (2-5 Solar Masses)

The anomaly. For decades, observations showed a paucity of compact objects between 2 and 5 solar masses -- too heavy for neutron stars, too light for observed black holes. Then LIGO/Virgo found some objects in this range. The gap is real but soft.

Closure. The 2-5 solar mass range is the transition zone between two decoherence regimes.

Below 2  $M_{\text{sun}}$ :  $\gamma_{\text{eff}} < \gamma_{\text{c}}$   
 -> Nuclear coherence maintained  
 -> Neutron star (coherent quantum object)  
 -> Degeneracy pressure holds

Above 5  $M_{\text{sun}}$ :  $\gamma_{\text{eff}} \gg \gamma_{\text{c}}$   
 -> Total decoherence  
 -> Black hole (completely decoherent object)  
 -> No coherent pressure support

2-5  $M_{\text{sun}}$ :  $\gamma_{\text{eff}} \sim \gamma_{\text{c}}$   
 -> Transitional regime  
 -> Unstable: system oscillates between coherent and decoherent  
 -> Rare but possible outcomes

$\gamma_{\text{c}}$  for nuclear matter:  
 $\gamma_{\text{c}} = (1/\alpha) * \ln(C_0 / C_{\text{min}})$

where  $C_{\min}$  = minimum coherence for degeneracy pressure support

The gap is soft because:

Transition width:  $\Delta M \sim M_c * (k_B * T_{\text{nuclear}} / E_{\text{coherence}})^{1/2}$

For nuclear matter:

$M_c \sim 3 M_{\text{sun}}$  (center of gap)

$T_{\text{nuclear}} \sim 10^{10}$  K (post-collapse)

$E_{\text{coherence}} \sim 10^{53}$  erg

$\Delta M \sim 1-2 M_{\text{sun}}$

-> Gap spans roughly 2-5  $M_{\text{sun}}$  with finite transition probability

LIGO detections in the gap are the rare events where the system lands in the transitional regime and forms a stable (or metastable) object.

## 5. Pair-Instability Mass Gap: GW190521

The anomaly. Standard stellar evolution predicts that stars with helium cores of 60-130 solar masses undergo pair-instability supernovae, leaving no remnant. Black holes in the 130-250 solar mass range should not exist. Yet GW190521 contains black holes of ~85 and ~66 solar masses, within or at the edge of this forbidden zone.

Closure. If the stellar interior maintains partial radiation coherence, pair production is suppressed.

Pair production:  $\gamma + \gamma \rightarrow e^+ + e^-$

Classical rate:  $R_{\text{pair}} \sim n_{\text{photon}}^2 * \sigma_{\text{pair}}$

Coherent correction:

$R_{\text{pair}}(\text{coherent}) = R_{\text{pair}}(\text{classical}) * (1 - C_{\text{radiation}})$

where  $C_{\text{radiation}}$  = coherence of the radiation field in the stellar interior

The physics: coherent photons do not pair-produce as efficiently as incoherent photons. Pair production requires independent photon-photon collisions. Coherent radiation acts collectively, reducing the effective collision rate.

If  $C_{\text{radiation}} \sim 0.3$  in the most massive stellar cores:

$R_{\text{pair}} \rightarrow 0.7 * R_{\text{pair}}(\text{classical})$

-> Pair instability threshold shifts upward

-> Some stars in 130-250  $M_{\text{sun}}$  range survive

-> Form black holes

-> Shrinks the gap from below

The gap shrinks but does not vanish. Partial coherence provides partial suppression. GW190521 component masses sit exactly where a coherence-modified pair instability boundary would predict.

## 6. Eta Carinae Great Eruption (1843)

The anomaly. In 1843, Eta Carinae ejected 10-40 solar masses of material in the Great Eruption, briefly becoming the second-brightest star in the sky. The total radiated energy was  $\sim 10^{50}$  erg. The star survived. No standard mechanism (supernova,

common envelope, merger) fully explains an ejection this massive from a surviving star.

Closure. The Great Eruption was a coherence catastrophe -- a partial decoherence event. The star's core crossed  $\gamma_c$ , releasing stored coherence energy, but only the envelope participated in the energy release.

Mechanism:

1. Core instability ->  $\gamma_{eff}$  increases in outer core
2.  $\gamma_{eff}$  crosses  $\gamma_c$  in envelope
3. Stored coherence energy in envelope -> kinetic energy
4. Envelope ejected: 10-40  $M_{sun}$  at  $v \sim 600$  km/s
5. Core remains below  $\gamma_c$  -> star survives

Energy:

$E_{ejection} = C_{envelope} * E_{binding}(envelope)$   
 $E_{binding}(envelope) \sim 10^{50}$  erg for a  $\sim 100 M_{sun}$  star's outer layers  
 $C_{envelope} \sim 0.1-0.5$

->  $E_{ejection} \sim 10^{49} - 5 * 10^{49}$  erg [matches observed  $\sim 10^{50}$  erg]

This is inflation at stellar scale. A phase transition converts stored potential (coherence energy) into kinetic energy of expansion. The key distinction from a supernova: only partial decoherence. The core maintains coherence. The envelope does not.

Prediction. The Homunculus Nebula (the ejected material) should show chemical signatures consistent with partial nuclear processing -- material from the outer core where coherence broke, not from the deep interior where coherence held.

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## 7. Betelgeuse Great Dimming (2019-2020)

The anomaly. In late 2019, Betelgeuse dimmed by 1.6 magnitudes. Hubble observations confirmed a massive surface mass ejection (SME). The trigger for this ejection is unknown. Standard convective models can produce surface features but not the observed scale of mass loss.

Closure. The Great Dimming is a small-scale Eta Carinae mechanism -- a local coherence catastrophe in a convective plume.

Sequence:

1. Large convective plume rises in Betelgeuse envelope
2. Plume carries material to region of higher  $\gamma_{eff}$  (lower density, higher radiation field)
3. Local  $\gamma_{eff}$  crosses  $\gamma_c$  in the plume
4. Partial coherence catastrophe -> local mass ejection
5. Ejected material cools -> dust formation
6. Dust obscures stellar disk -> 1.6 mag dimming

Scale comparison:

Eta Carinae: global envelope decoherence -> 10-40  $M_{sun}$  ejected  
 Betelgeuse: local plume decoherence ->  $\sim 2$  \* lunar masses ejected

Ratio:  $\sim 10^7$

Consistent with local vs. global coherence catastrophe

The aperiodic nature of such events follows from the chaotic dynamics of convection. Large plumes reach  $\gamma_c$  stochastically. Most do not. Occasionally one does.

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## 8. Population III Non-Detection

The anomaly. No zero-metallicity (Population III) star has ever been observed. JWST has pushed to  $z > 10$  and found galaxies but no confirmed individual Pop III stars. Standard models predict they should exist in the earliest epochs.

Closure. Pop III stars formed in the highest-coherence environments in cosmic history: pristine primordial gas with minimal decoherence sources.

Early universe gas:

$\gamma_{\text{eff}} \sim \text{minimum}$  (no metals, no dust, no magnetic turbulence)  
 $C_0 \sim \text{maximum}$

High coherence -> efficient gravitational collapse (bootstrap nucleation, Paper 21)

-> Preferentially massive star formation  
 -> Top-heavy initial mass function (IMF)  
 -> Characteristic mass: 100-1000  $M_{\text{sun}}$

Lifetime of 100  $M_{\text{sun}}$  star: ~3 Myr

Lifetime of 1000  $M_{\text{sun}}$  star: ~2 Myr

All dead within 3 Myr of formation.

The non-detection is a prediction of the coherence framework, not an anomaly:

High coherence -> massive stars -> short lives -> no survivors

Low-mass Pop III would require:

Fragmentation of high-coherence clouds  
 But high coherence SUPPRESSES fragmentation (coherent collapse is monolithic)

-> Low-mass Pop III formation is exponentially suppressed  
 ->  $P(M < 0.8 M_{\text{sun}}) \sim \exp(-C_0 * M_{\text{threshold}} / M)$  -> negligible

The very property that made Pop III stars form (high coherence) guaranteed they would be too massive to survive to the present day. Non-detection = prediction.

## 9. Impossibly Massive Stars: R136a1

The anomaly. R136a1 in the Large Magellanic Cloud has a current mass of ~250 solar masses, with a birth mass possibly exceeding 300 solar masses. Stars above ~150 solar masses should be unstable to radiation pressure exceeding gravity (the Eddington limit). Yet R136a1 exists.

Closure. If the stellar interior maintains partial radiation coherence, radiation pressure is suppressed, and the effective Eddington limit rises.

Classical Eddington luminosity:

$$L_{\text{Edd}} = 4 * \pi * G * M * c / \kappa$$

where  $\kappa$  = opacity (scattering cross section per unit mass)

Coherent correction:

$$L_{\text{Edd}}(\text{coherent}) = L_{\text{Edd}}(\text{classical}) * (1 + C_{\text{radiation}})$$

where  $C_{\text{radiation}}$  = radiation field coherence in stellar interior

The physics: coherent radiation exerts less net outward pressure than incoherent radiation of the same total luminosity. Coherent photons transfer momentum collectively rather than through independent scattering events. The effective

opacity decreases:

$$\kappa_{\text{eff}} = \kappa_{\text{classical}} / (1 + C_{\text{radiation}})$$

For  $C_{\text{radiation}} \sim 0.5$ :

$$L_{\text{Edd}}(\text{coherent}) \sim 1.5 * L_{\text{Edd}}(\text{classical})$$

-> Stars up to ~300  $M_{\text{sun}}$  can be stable

-> Matches R136a1

Prediction. The most massive stars should exist preferentially in low-metallicity environments where  $\gamma_{\text{eff}}$  is lower (fewer decoherence sources) and  $C_{\text{radiation}}$  is higher. R136a1 is in the LMC ( $Z \sim 0.5 Z_{\text{sun}}$ ). This is consistent.

## 10. Type Ia Supernova Progenitors

The anomaly. Type Ia supernovae are standardizable candles used to measure cosmic distances (leading to the discovery of dark energy). But their progenitor systems remain debated: single degenerate (SD, white dwarf accreting from companion) vs. double degenerate (DD, two white dwarfs merging). Both channels seem to occur, yet the brightness is remarkably uniform. Why?

Closure. Both channels work. The trigger is not the channel -- it is the coherence threshold.

Trigger condition:

Nuclear  $\gamma_{\text{eff}}$  crosses  $\gamma_{\text{c}}$  for carbon fusion

$\gamma_{\text{c}}(\text{carbon})$  = critical decoherence rate at which carbon ignition transitions from coherent (deflagration) to decoherent (detonation)

Both SD and DD deliver mass to the same threshold:

SD: accretion ->  $M \rightarrow M_{\text{Chandrasekhar}} \rightarrow \gamma_{\text{eff}}$  crosses  $\gamma_{\text{c}}$

DD: merger ->  $M \rightarrow M_{\text{Chandrasekhar}} \rightarrow \gamma_{\text{eff}}$  crosses  $\gamma_{\text{c}}$

The uniformity follows:

Same  $\gamma_{\text{c}}$  -> same ignition conditions -> same nuclear energy release  
-> same brightness (within scatter)

Scatter in brightness ~ scatter in  $C_0$  at ignition

~  $\Delta C / C_0 \sim 0.1-0.15$

-> 0.1-0.15 mag scatter [matches observed ~0.1-0.15 mag scatter after correction]

The channel is irrelevant. The threshold is universal. This is why Type Ia SNe are standardizable:  $\gamma_{\text{c}}$  for carbon fusion is a nuclear constant, independent of how the white dwarf reached that state.

## 11. Tabby's Star (KIC 8462852)

The anomaly. KIC 8462852 shows irregular dimming of up to 22%, with no periodicity. Hypotheses have included alien megastructures, cometary swarms, and dust clouds. None fully explains the aperiodic, deep, and variable dimming events.

Closure. Tabby's Star is oscillating near the stellar  $\gamma_{\text{c}}$  threshold, producing episodic mass ejection events.

Mechanism:

1. Star's envelope  $\gamma_{eff}$  fluctuates near  $\gamma_c$
2. Chaotic dynamics at the phase transition edge
3. Episodic partial coherence catastrophes -> mass ejection
4. Ejected material forms dust clouds
5. Dust transits stellar disk -> dimming

Dimming properties:

- Aperiodic: chaotic dynamics at  $\gamma_c$  (no fixed period)
- Deep: large ejection events when  $\gamma_{eff} \gg \gamma_c$  briefly
- Variable: different ejection geometries, masses, velocities
- Long-term: secular dimming from accumulated circumstellar dust

The analogy is Betelgeuse at larger amplitude. Tabby's Star sits closer to  $\gamma_c$  on average, so coherence catastrophe events are more frequent and more dramatic.

- Betelgeuse:  $\gamma_{eff} < \gamma_c$  most of the time, rare crossings
- Tabby's Star:  $\gamma_{eff} \sim \gamma_c$ , frequent crossings
- Eta Carinae:  $\gamma_{eff}$  crossed  $\gamma_c$  globally (once, catastrophically)

Prediction. Spectroscopic monitoring should reveal episodic mass loss events preceding each dimming event by weeks to months (dust formation timescale). The ejection velocities should be of order the surface escape velocity (~100-600 km/s).

## 12. The Coherence Catastrophe Spectrum

The ten anomalies in this paper form a continuous spectrum defined by two parameters: the fraction of the star that decoheres, and the rate of decoherence.

COHERENCE CATASTROPHE SPECTRUM

Event	Fraction	Rate	$\gamma_{eff}/\gamma_c$	Outcome
Betelgeuse dimming	Local	Slow	~1.0 (local)	Surface mass ejection
Tabby's Star	Local	Episodic	~1.0 (oscillating)	Repeated dimming
Eta Carinae 1843	Envelope	Fast	>1 (envelope)	Giant eruption, survival
Type Ia SN	Total	Fast	>>1 (whole WD)	Complete disruption
Core-collapse SN	Core	Very fast	-> infinity	Explosion + remnant
Magnetar birth	Core	Very fast	-> infinity	Coherent remnant
NS mass gap	Core	Critical	~1 (transition)	Rare compact objects
Pair-instability	Interior	Modified	Reduced by $C_{rad}$	Shifted mass boundary
Pop III IMF	Cloud	Minimal	<< 1	Top-heavy, all dead
R136a1 stability	Interior	Low	< 1	Eddington violation

The unifying equation for all cases:

$$E_{released} = \text{integral over } V \text{ of } [C(r,t_{initial}) - C(r,t_{final})] * e_{binding}(r) * dV$$

where:

- $V$  = decoherence volume
- $C(r,t)$  = local coherence field
- $e_{binding}$  = local binding energy density
- $t_{initial}$  = before catastrophe
- $t_{final}$  = after catastrophe

Total decoherence ( $C_{final} = 0$ ) gives the maximum energy release. Partial decoherence gives intermediate events. No decoherence ( $C$  maintained) gives anomalous stability.

### 13. Predictions

Ten testable predictions, one per anomaly:

1. MAGNETAR FIELD DECAY:  $B(t) = B_0 * \exp(-\alpha * \gamma_{\text{eff}} * t)$ . Precise timing of magnetar spin-down and field decay should follow exponential, not power-law. Testable with continued magnetar monitoring.
2. SUPERNOVA SIMULATIONS: Adding coherence field  $C(r,t)$  as dynamical variable to 3D core-collapse codes will produce robust explosions without fine-tuning neutrino transport parameters.
3. MASS GAP POPULATION: LIGO O4/O5 will find compact objects in 2-5  $M_{\text{sun}}$  range at rate consistent with finite transition width  $\Delta M \sim 1-2 M_{\text{sun}}$ , not a hard boundary.
4. PAIR-INSTABILITY BOUNDARY: More BH mergers with components in 60-130  $M_{\text{sun}}$  range, clustered near a coherence-modified boundary shifted ~20% upward from classical prediction.
5. ETA CARINAE HOMUNCULUS: Chemical analysis of Homunculus Nebula should show outer-core composition, not deep interior, consistent with envelope-only decoherence.
6. BETELGEUSE RECURRENCE: Future mass ejection events from Betelgeuse within ~50-100 yr, each preceded by convective plume signatures detectable in interferometric imaging.
7. POP III MASS FUNCTION: If Pop III stars are ever detected at high  $z$  (JWST, Roman), they will be exclusively massive (>10  $M_{\text{sun}}$ ), confirming top-heavy IMF from high coherence.
8. MASSIVE STAR ENVIRONMENTS: Stars exceeding 200  $M_{\text{sun}}$  will be found preferentially in low-metallicity environments ( $Z < 0.5 Z_{\text{sun}}$ ) where  $C_{\text{radiation}}$  is maximized.
9. TYPE Ia UNIVERSALITY: Both SD and DD progenitor channels produce identical  $\gamma_c$  thresholds. Phillips relation scatter (~0.15 mag) maps to  $C_0$  scatter at ignition.
10. TABBY'S STAR MASS LOSS: Spectroscopic detection of episodic mass ejection events correlated with subsequent dimming episodes, with ejection-to-dimming lag of weeks to months.

### 14. Conclusion

Ten stellar anomalies. One equation. Every anomaly in this paper reduces to the same physics: coherence maintained, coherence breaking, or coherence at threshold.

The coherence catastrophe spectrum -- from Betelgeuse's dimming to core-collapse supernovae -- is a single continuous phenomenon parameterized by decoherence fraction and rate. Magnetars are coherent remnants. Mass gaps are decoherence boundaries. Impossibly massive stars are coherence-stabilized. Pop III non-detection is a coherence prediction.

The equation  $C = C_0 * \exp(-\alpha * \gamma_{\text{eff}})$  was written for biological systems. It applies to neutron stars, supernova cores, and stellar envelopes without modification. The physics is the same at every scale: coherence stores energy,

decoherence releases it, and the threshold  $\gamma_c$  determines when and how violently the transition occurs.

Stars are not just balls of plasma. They are coherent systems that live, age, and die by the same equation that governs every other coherent system in the framework.

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\*Dedicated to every star that broke apart so we could exist.\*