DAWN — Formula Sheet

Memory / Residue / Mycelium

Shimmer decay: $S(t) = S\, e^{\wedge}(-\ t)$
Crystallization prob.: p_ash = $(a(\_ash - S(t)) + b\,SHI + c\,Ash\_local)$
Ash nutrient yield: Y_ash = $\_conv \cdot stability \cdot \lVert P \rVert$
Allocation softmax: $a = \exp(D\ ) / \sum \exp(D\ )$
Autophagy trigger: if $E < \_prune$ for ticks metabolize

Bloom / Juliet

Rebloom prob.: p_rebloom = $(k\ n\_access + k\ coherence\_path + k\ Ash\_near - k\ entropy)$
Depth update: $d = \min(d + 1\{p\_rebloom\ high\}, d\_max)$
Visual intensity: $I = \min(\ d + \ entropy, 1)$

Topology

Reproject objective: $\min_w \ (\lVert x - x \rVert - f(e\ , e\ ))^2 + \lVert x - x\_prev \rVert^2$
Laplacian smoothness: $R = \tfrac{1}{2}\ w\ \lVert x - x \rVert^2$
Lift/Sink gates: lift if Ash_local > $\&\ \_edges < \_$; sink if Soot_local > or $E < \_E$

Tracers

Spawn _crow = $\_E\ entropy + \_\ \_mean$

Spawn $\lambda\_whale = \alpha\_D \cdot drift + \beta\_V(1 - SHI)$	
Retire prob. $= \sigma(r\_? - r\_utility)$	
Budget: $\sum c\_n \leq tracer\_cap$	

Forecasting

Cognitive Pressure: $P = B \cdot \sigma^2$
Forecast Index: $F = P / A, \quad A = w\_N N + w\_T S\_T + w\_S M\_SHI$
Confidence calibration: $Pr(ok|F) = \sigma(aF + b)$
Horizon variance: $Var[F\_?] \approx Var[P]/A^2 + P^2 Var[1/A]$
Anomaly score: $z = \sqrt{(z\_P^2 + z\_\sigma^2 + z\_{drift}^2)}$

SCUP

Loss prob.: $p\_loss = \sigma(aF^* + b P\_hat + c \cdot drift + d \cdot \bar{\sigma} - eA - fSHI)$
Controller (PID-lite): $u\_? = k\_P e\_? + k\_I \sum e + k\_D(e\_? - e\_{?})$
Lyapunov stability: $V = (S\_target - SHI)^2$, enforce $\Delta V < 0$

Voice / Echo

Mutation rate: $\mu\_? = \alpha P + \beta(1 - SHI), \quad \mu\_?^* = \min(\mu\_?, \mu\_{max})$
Resonance match: $m = \langle \cdot, s \rangle / (\|\cdot\| \|s\|)$
Spectral balance: $\max(E\_band / \sum E) \leq 0.7$

Pigments

Retrieval bias: w' $= w$ $(1 +$ dominant(P))	
Balance penalty: L_pig $=$ (max(P) $-$ min(P))	

Error / Scoring

MAE $= (1/N)$ $|F\_forecast - F\_actual|$
RMSE $=$ $((1/N)$ $(F\_forecast - F\_actual)^2)$
Brier score: BS $= (1/N)$ $(p\_loss - y)^2$
Log loss $= -(1/N)$ $[y \log p + (1 - y) \log(1 - p)]$
Actuation efficiency: $=$ SHI $/u$

Safety / Budgets

Motion budget: $\| x \|$ M_max
Energy floor: E_mycelial required