GKSL aus Repeated Interactions + VERIFIKATION

Trace-out & Raten | GKSL & Fits | Verification Suite | Export

Repeated Interactions: unitäre Kollisionen + partielle Spur

ω (System) 1.00

β (Bad) 2.00

Kopplung g 0.50

Pulsdauer τ_int 0.20

Kollisionsintervall Δt 0.20

Anzahl Kollisionen 60

θ (Startzustand) 1.05

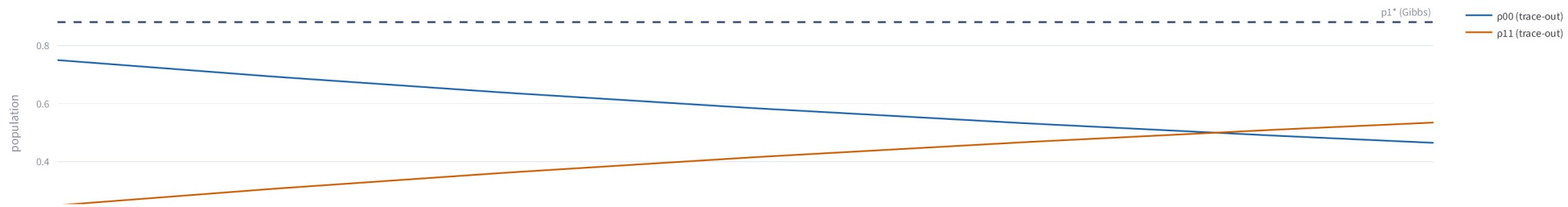
ϕ (Startzustand) 0.00

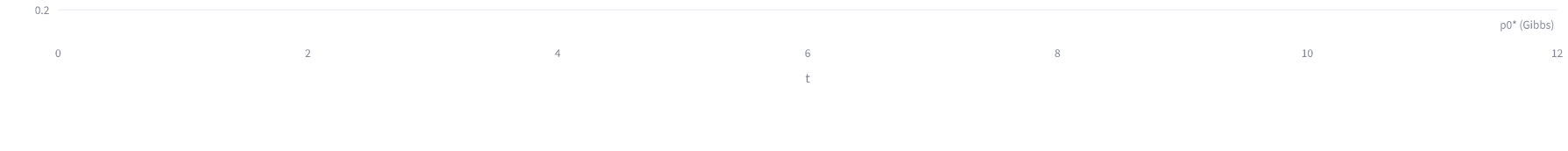
Run micro trace-out

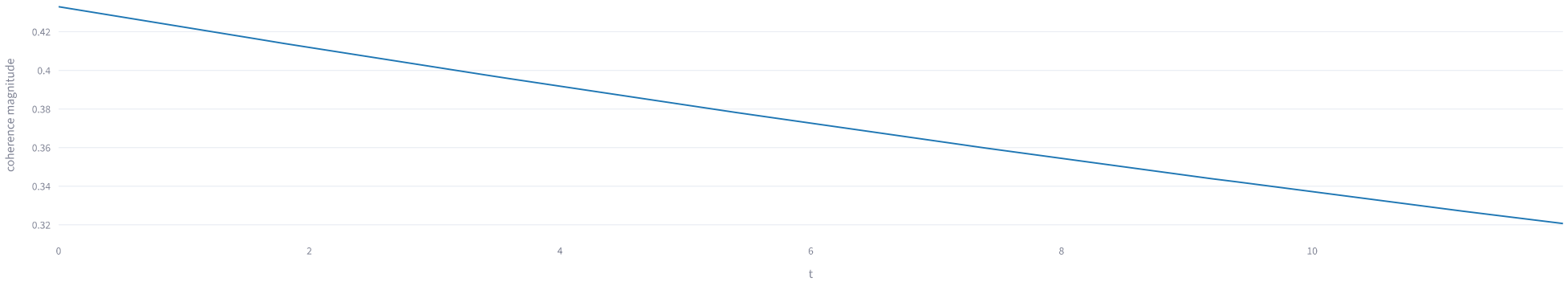
Ancilla thermal: p_exc≈0.1192, p_gnd≈0.8808 (KMS: p_exc/p_gnd=e^(-βω))

Raten (aus Mikro): γ↓≈0.04389, γ↑≈0.00594

KMS-Check: γ↑/γ↓ − e^(-βω) ≈ 2.776e-17







PSD(last)=True, Tr≈1.000000

Supplement (Tab 1: Micro → Raten, KMS)

Collision-Map & partielle Spur

$$\rho_S' = \mathrm{Tr}_B\left[\, U\,(\rho_S \otimes \tau_B)\, U^\dagger \,\right]$$

$$U = e^{-i\theta(\sigma_+ \otimes \sigma_- + \sigma_- \otimes \sigma_+)}$$

Thermischer Ancilla-Zustand (KMS)

$$\tau_B = \frac{e^{-\beta(\omega/2)\sigma_z}}{\mathrm{Tr}\, e^{-\beta(\omega/2)\sigma_z}} = \mathrm{diag}(p_{\mathrm{exc}}, p_{\mathrm{gnd}})$$

$$\frac{p_{\mathrm{exc}}}{p_{\mathrm{gnd}}} = e^{-\beta\omega}$$

Raten im kleinen Winkel

$$\gamma_\downarrow = \frac{\sin^2\theta}{\Delta t}\, p_{\mathrm{gnd}}, \qquad \gamma_\uparrow = \frac{\sin^2\theta}{\Delta t}\, p_{\mathrm{exc}}.$$