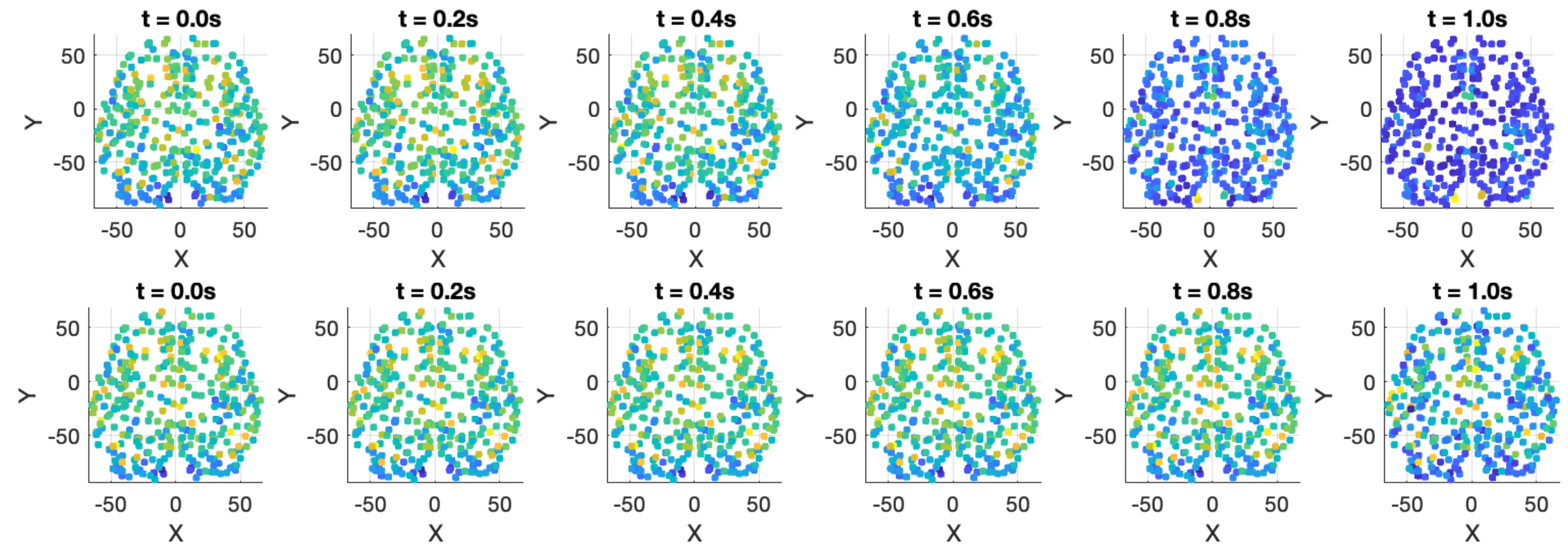
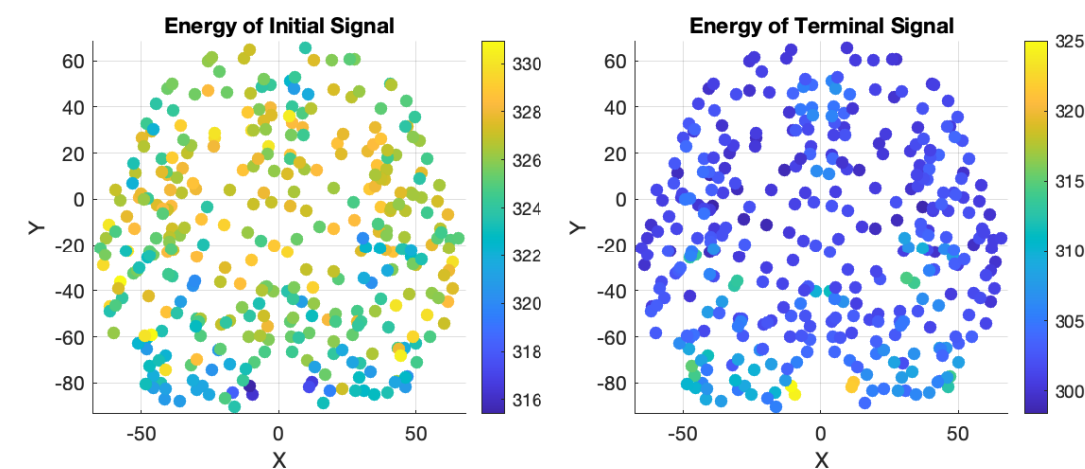
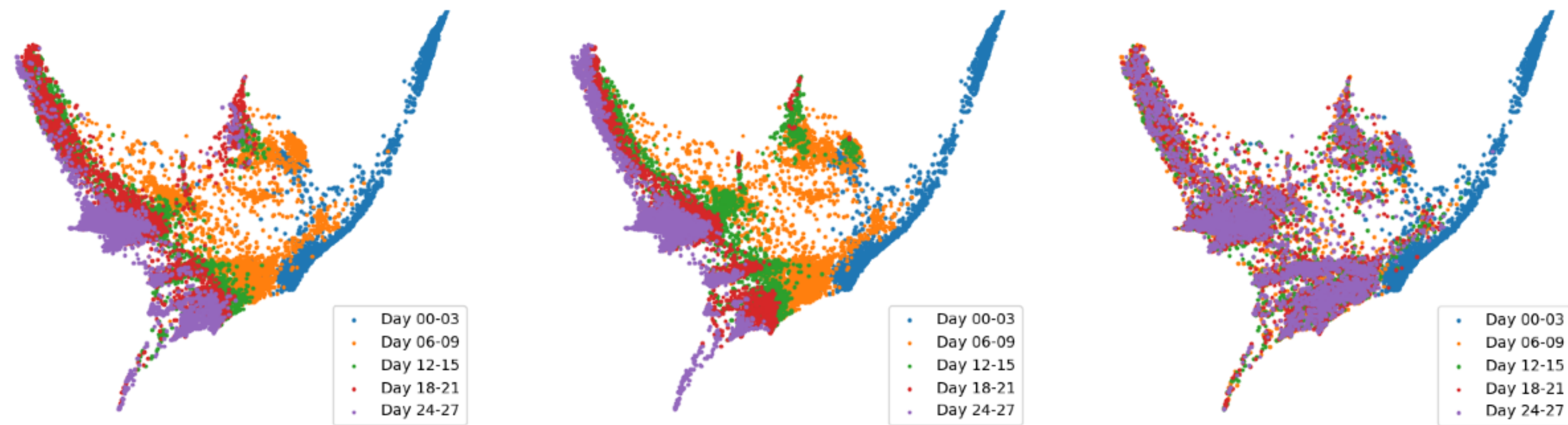


Topological signal matching

- Brain fMRI signals



- Single-cell dynamics [Moon 2019, Tong 2023, 2024]



Groundtruth

TSB-BM

SB-BM

Optimal TSB - Gaussian case

- Consider **Gaussian** end distributions $\rho_0 \sim N(\mu_0, \Sigma_0), \rho_1 \sim N(\mu_1, \Sigma_1)$
- Results 1: time-marginal $X_t \sim \mathbb{P}_t = N(\mu_t, \Sigma_t)$

$$X_t = \bar{R}_t X_0 + R_t X_1 + \xi_t - R_t \xi_1 + \Gamma_t Z$$

- $R_t = K_{t1} K_{11}^{-1}, \quad \bar{R}_t = \Psi_t - R_t \Psi_1, \quad \Gamma_t := \text{Cov}[Y_t | (Y_0, Y_1)] = K_{tt} - K_{t1} K_{11}^{-1} K_{1t}$
- Stochastic interpolant expression [Albergo et al. 2023] Proof ideas: [Bunne et al. 2023]
- **Disintegration of measures**: static Gaussian TSBP + recent result on Gaussian E-OT [Janati et al. 2020]
- **Reciprocal property** [Föllmer 1988]: \mathbb{P} shares the bridge with the reference $\mathbb{Q}_{\mathcal{T}}$