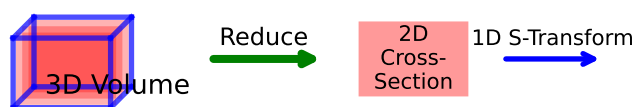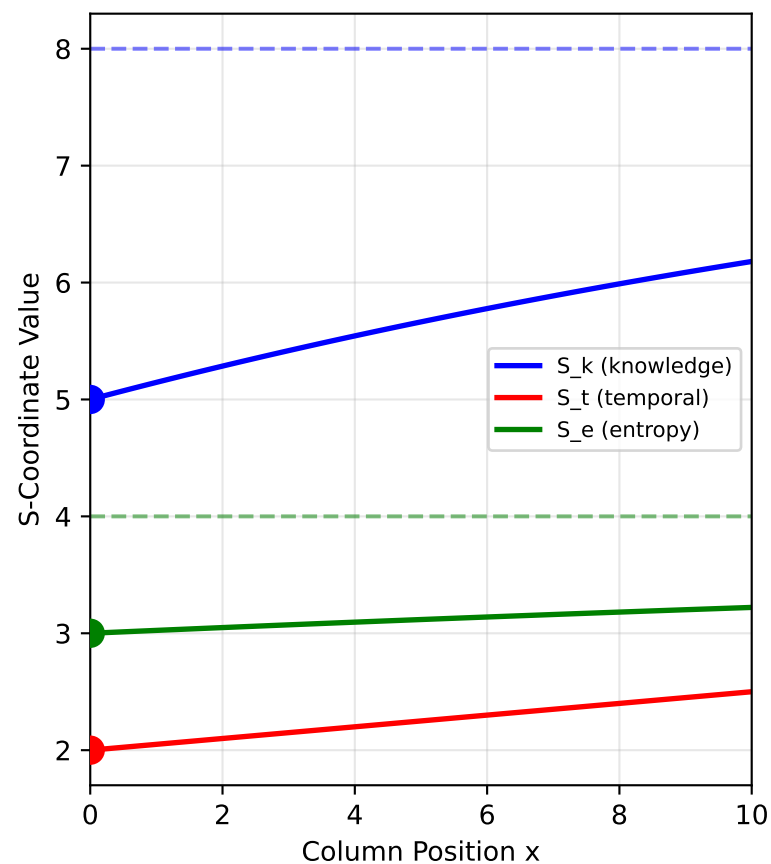# Section 3: Deriving Fluid Structure - Experimental Validation

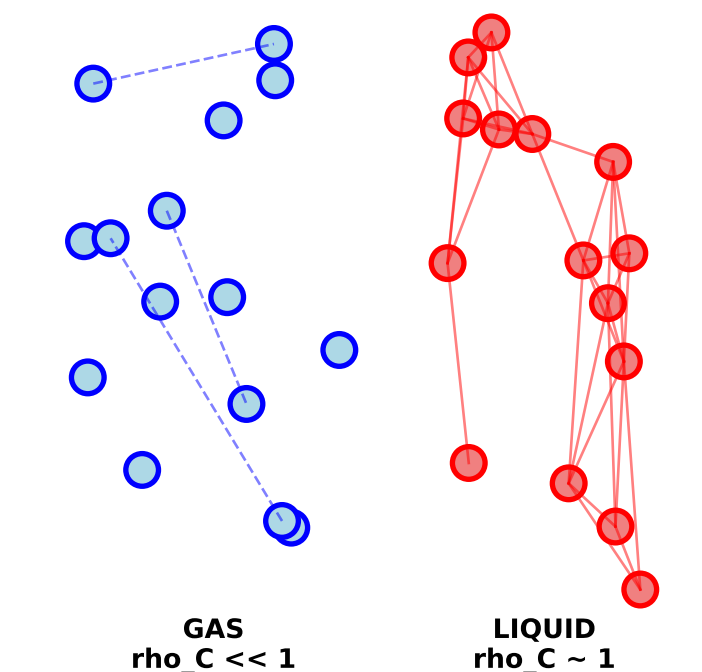

A. Dimensional Reduction: 3D -> 2D x 1D

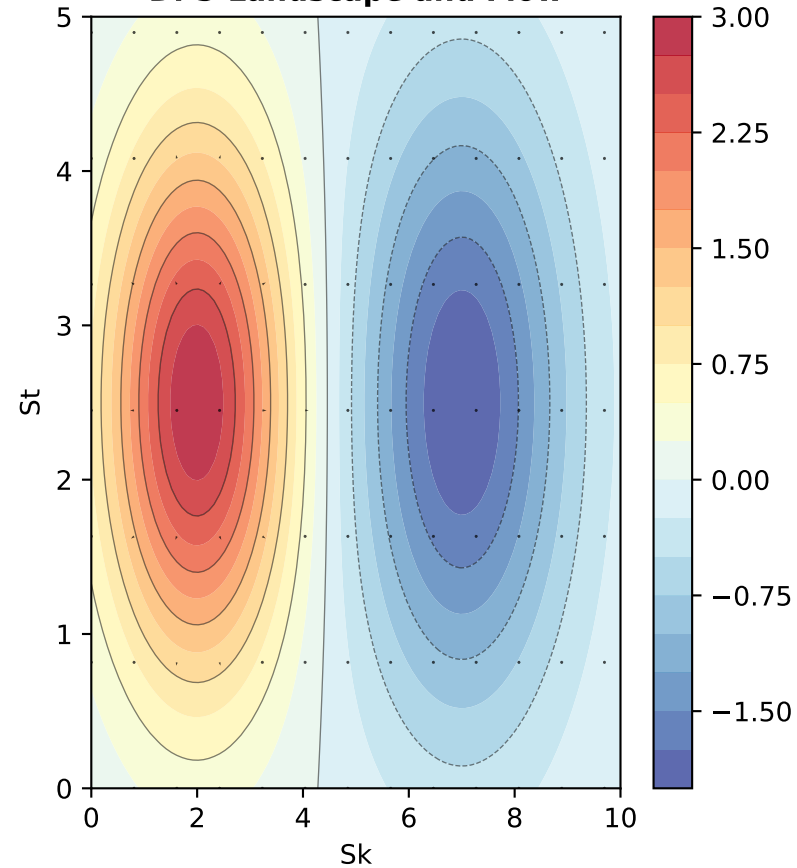3D Volume → Reduce → 2D Cross-Section → 1D S-Transform
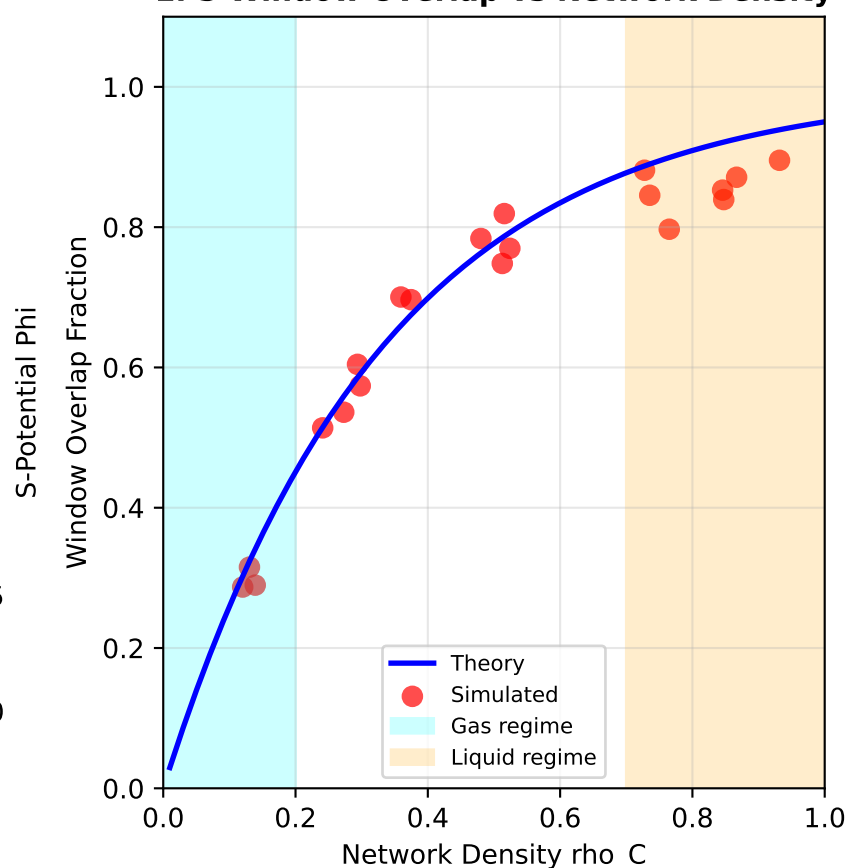
B. Cross-Section S-State Evolution

- S_k (knowledge)
- S_t (temporal)
- S_e (entropy)

S-Coordinate Value vs Column Position x

C. Gas vs Liquid: Network Density

GAS $\rho_C \ll 1$

LIQUID $\rho_C \sim 1$

D. S-Landscape and Flow

S-Potential Phi, St vs Sk

E. S-Window Overlap vs Network Density

- Theory
- Simulated
- Gas regime
- Liquid regime

Window Overlap Fraction vs Network Density ρ_C

F. Computational Complexity

- Full 3D: $O(N^3)$
- Reduced: $O(N)$
- Speedup

Operations (log scale) / Speedup Factor vs Grid Size N