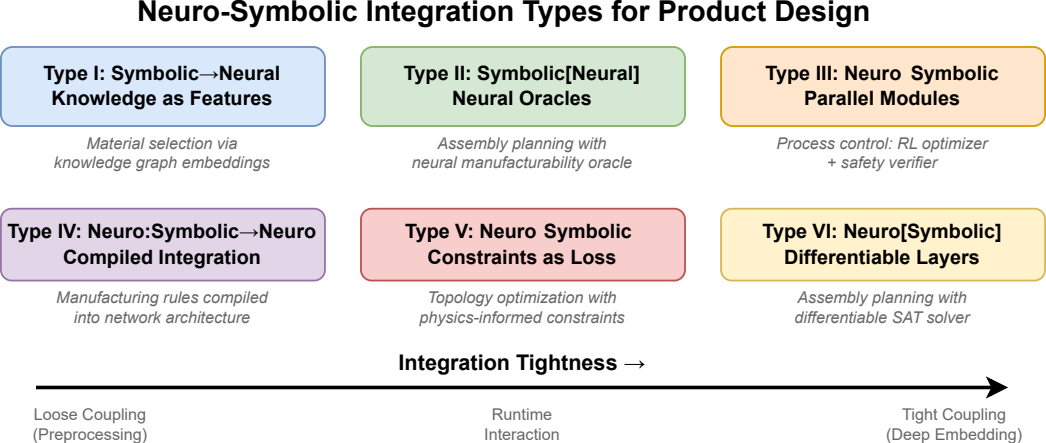
Neuro-Symbolic Integration Types for Product Design
Type I: Symbolic→Neural
Knowledge as Features
Material selection via
knowledge graph embeddings
Type II: Symbolic[Neural]
Neural Oracles
Assembly planning with
neural manufacturability oracle
Type III: Neuro Symbolic
Parallel Modules
Process control: RL optimizer
+ safety verifier
Type IV: Neuro:Symbolic→Neuro
Compiled Integration
Manufacturing rules compiled
into network architecture
Type V: Neuro Symbolic
Constraints as Loss
Topology optimization with
physics-informed constraints
Type VI: Neuro[Symbolic]
Differentiable Layers
Assembly planning with
differentiable SAT solver
Integration Tightness →
Loose Coupling
(Preprocessing)
Runtime
Interaction
Tight Coupling
(Deep Embedding)