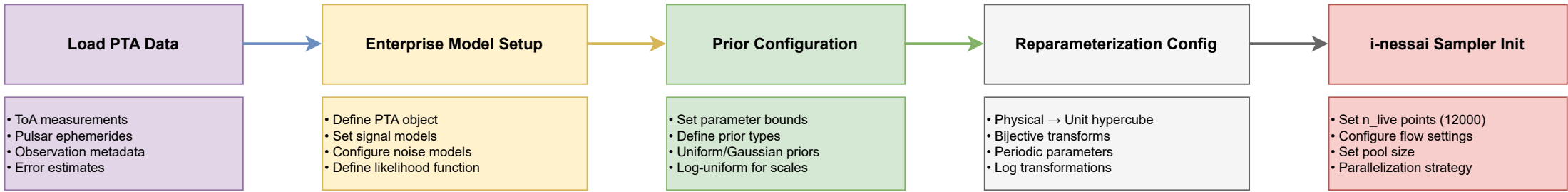
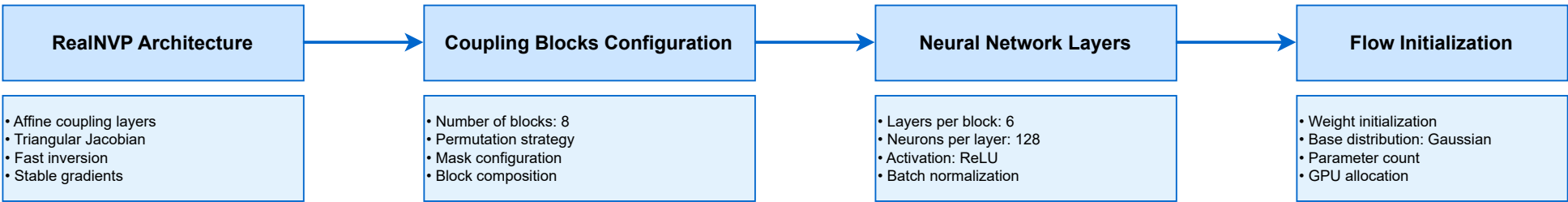


# i-nessai Training Workflow for PTA Analysis

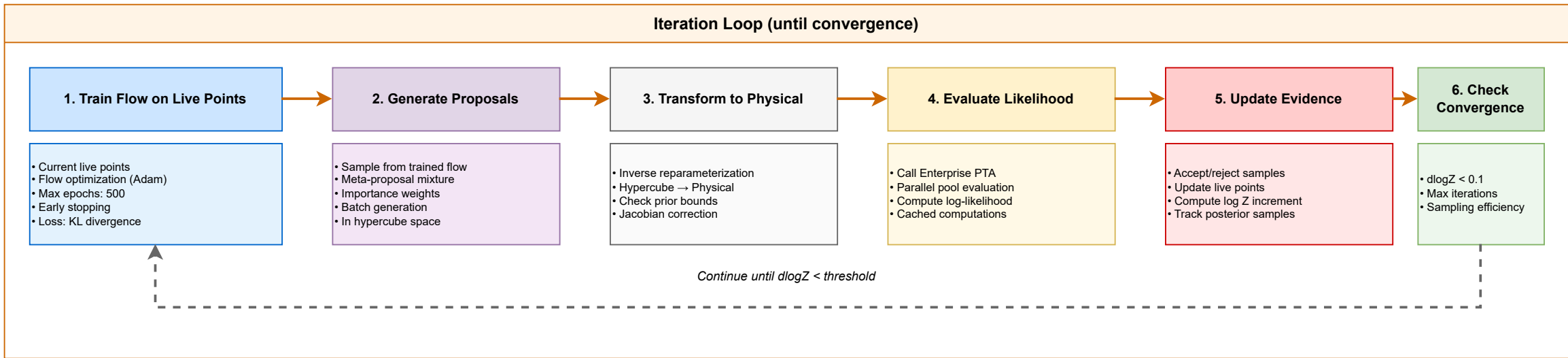
## PHASE 1: Data Preparation



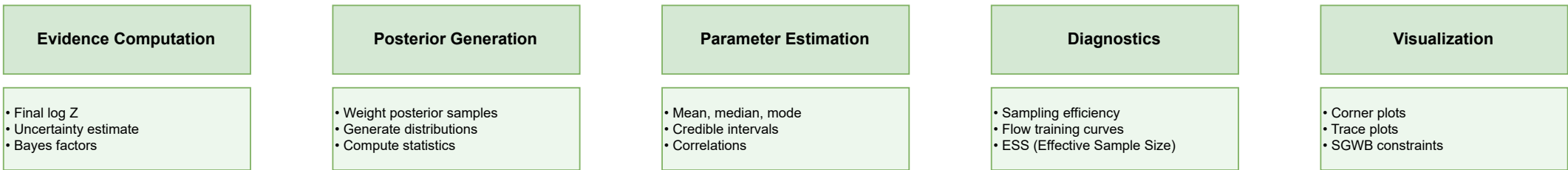
## PHASE 2: Normalizing Flow Architecture Setup



## PHASE 3: Nested Sampling Training Loop



## PHASE 4: Results & Post-Processing



### Performance Metrics

#### Wall-clock Time

Single pulsar: minutes  
10 pulsars: ~13 hours

#### Likelihood Evaluations

~2.68x fewer than nessai  
~13.3x fewer than dynesty

#### Speedup Factor

1-3 orders of magnitude  
vs PTMCMC

#### Parallelization Efficiency

Near-linear scaling  
with pool size

### Key Hyperparameters

$n_{\text{live\_points}}$ : 1000-20000  
 $\text{flow\_blocks}$ : 8  
 $\text{layers\_per\_block}$ : 6  
 $\text{neurons\_per\_layer}$ : 128  
 $\text{pool\_size}$ : 12 (for parallelization)  
 $\text{max\_epochs}$ : 500 (flow training)  
 $d\log Z_{\text{threshold}}$ : 0.1  
 $\text{learning\_rate}$ :  $1e-3$  (Adam)  
 $\text{batch\_size}$ : varies with  $n_{\text{live}}$   
 $\text{importance\_sampling}$ : enabled  
 $\text{reparameterization}$ : to\_unit\_hypercube  
 $\text{checkpoint\_interval}$ : 1000 iterations