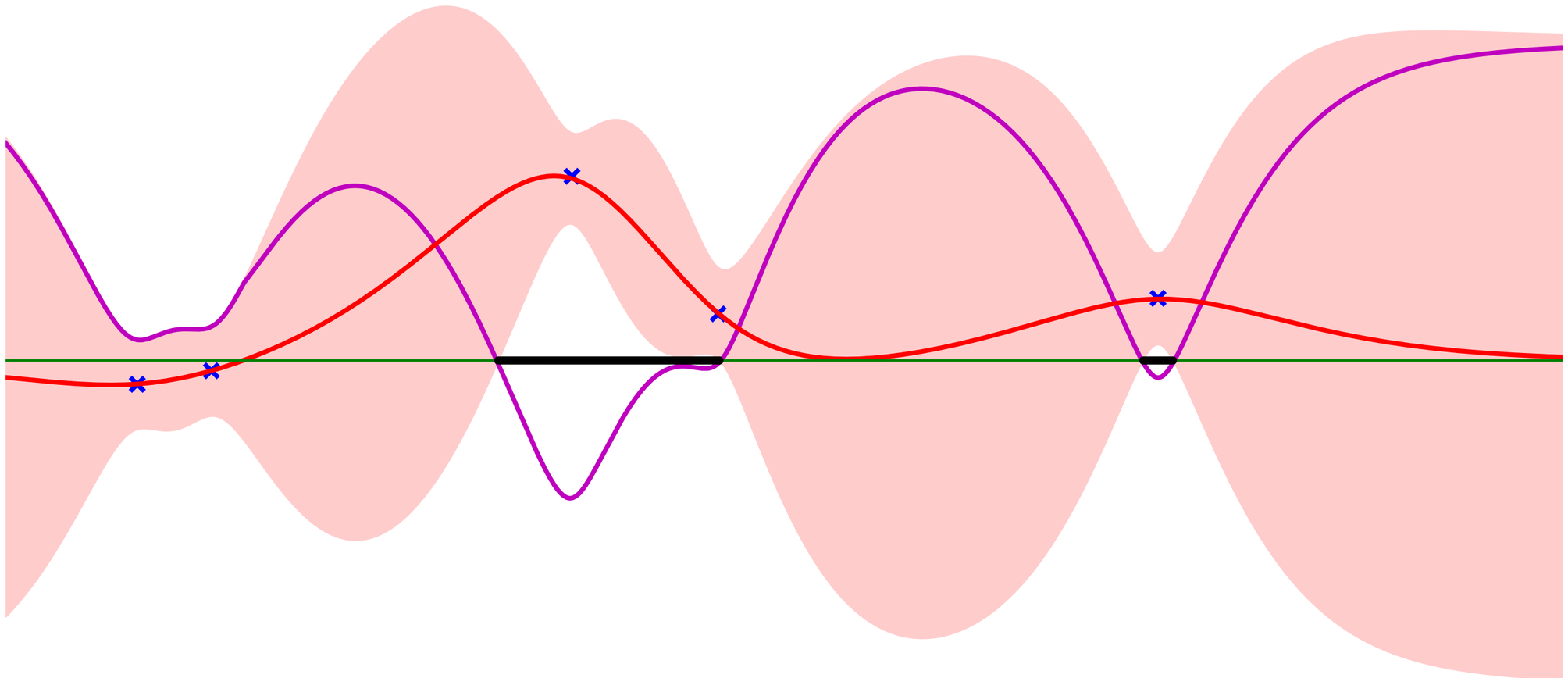


Zi Wang (MIT CSAIL)

Robot Learning

10

Active learning of constraints

Constraint: $g(\theta) > 0$

mean function $\mu(\theta)$
confidence interval $\mu(\theta) \pm 2\sigma(\theta)$
observation $(\theta_i, g(\theta_i))$

acquisition function

$$\phi(\theta) = 2\sigma(\theta) - |\mu(\theta)|$$

$\phi(\theta)$ has high value if
mean close to 0 or high variance

next: test action with parameter

$$\theta^* = \operatorname{argmax} \phi(\theta)$$

#observations = 5

[Straddle algorithm, Bryan et al, NIPS 2016]

Active learning of constraints *[Straddle algorithm, Bryan et al, NIPS 2016]*

mean function $\mu(\theta)$

confidence interval $\mu(\theta) \pm 2\sigma(\theta)$

x observation $(\theta_i, g(\theta_i))$

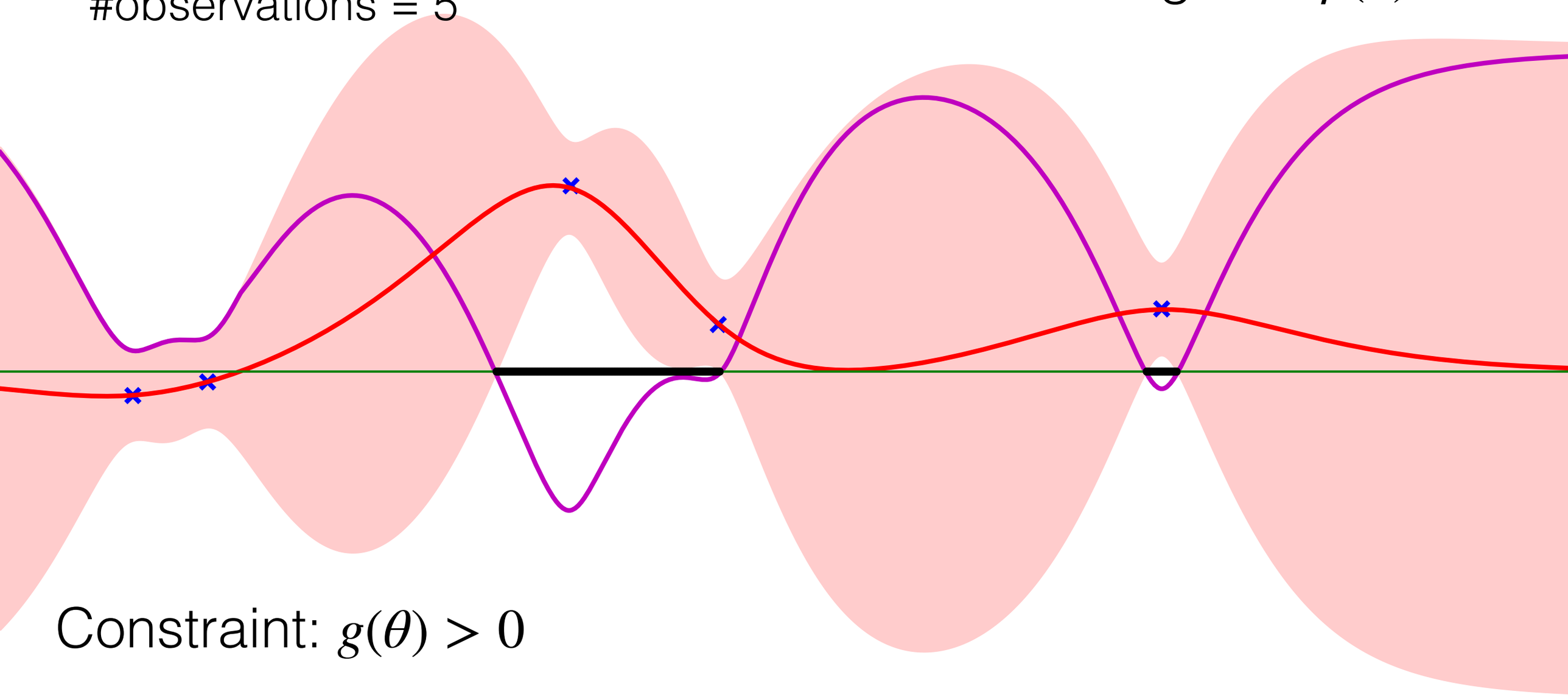
#observations = 5

acquisition function

$$\phi(\theta) = 2\sigma(\theta) - |\mu(\theta)|$$

next: test action with parameter

$$\theta^* = \text{argmax } \phi(\theta)$$



Constraint: $g(\theta) > 0$

Active learning of constraints

mean function $\mu(\theta)$

confidence interval $\mu(\theta) \pm 2\sigma(\theta)$

x observation $(\theta_i, g(\theta_i))$

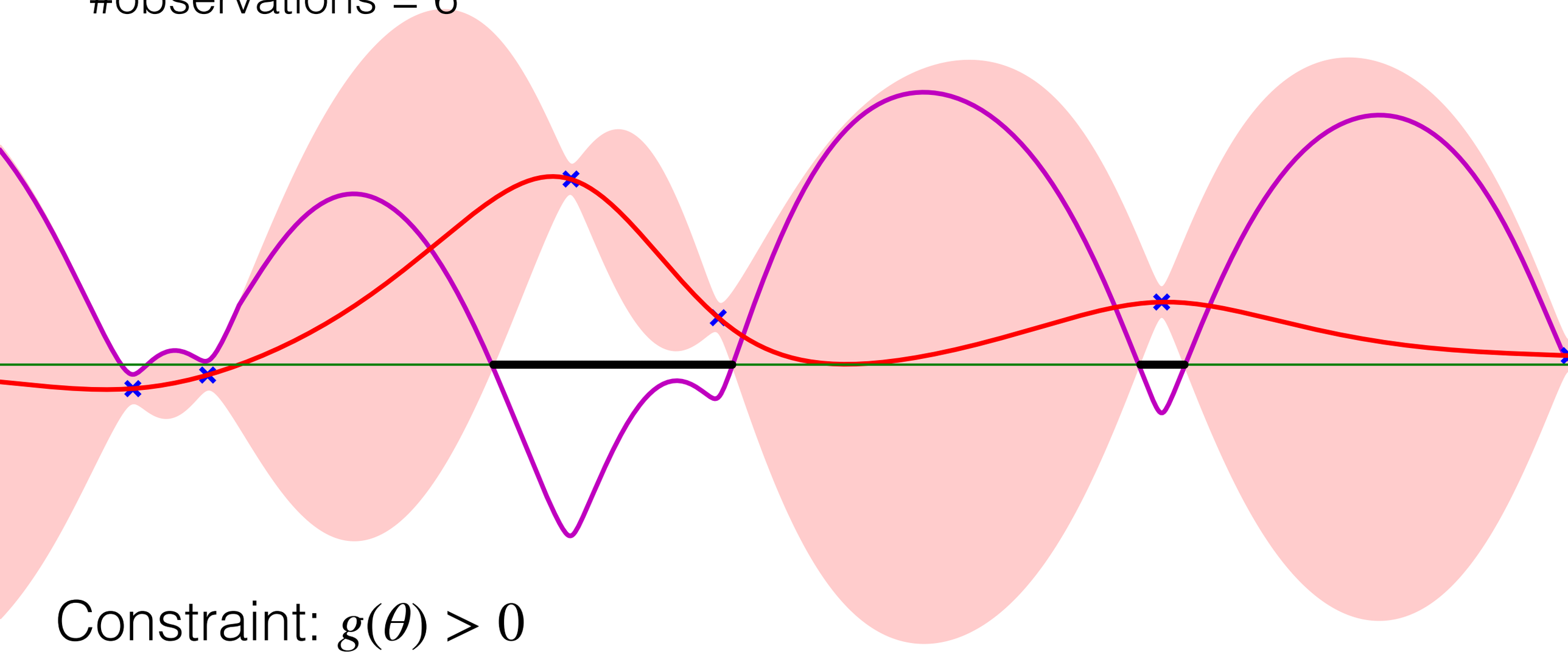
#observations = 6

acquisition function

$$\phi(\theta) = 2\sigma(\theta) - |\mu(\theta)|$$

next: test action with parameter

$$\theta^* = \text{argmax } \phi(\theta)$$



Constraint: $g(\theta) > 0$