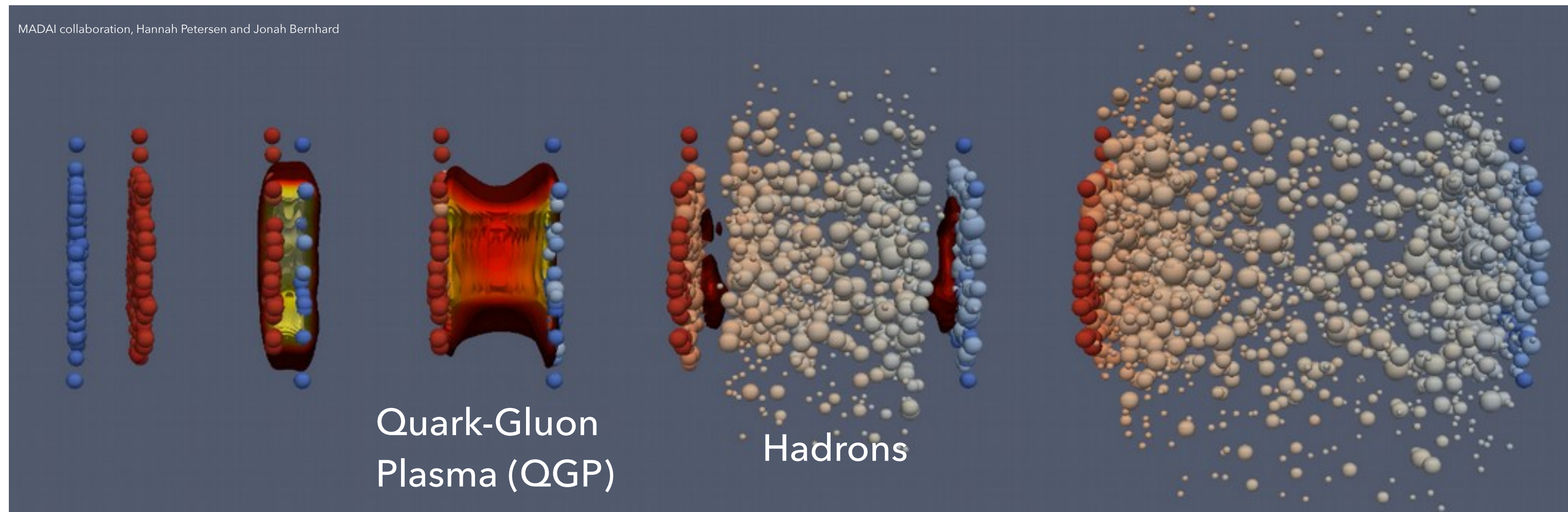


time



collision systems

Au+Au @ 200 GeV

Pb+Pb @ 2.76 TeV

Pb+Pb @ 5.02 TeV

particlization models

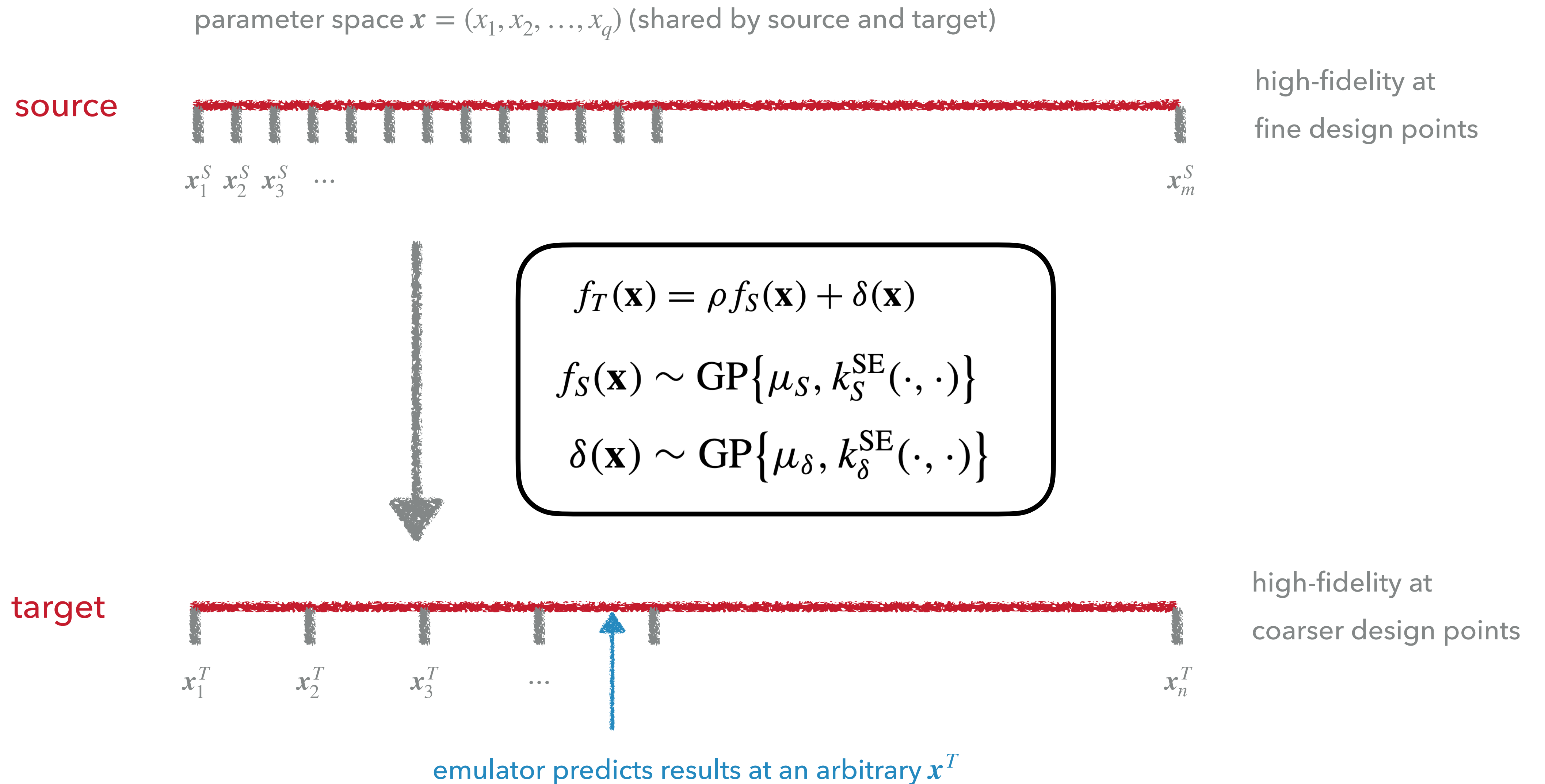
Grad

Chapman-Enskog

Pratt-Torrieri-Bernhard



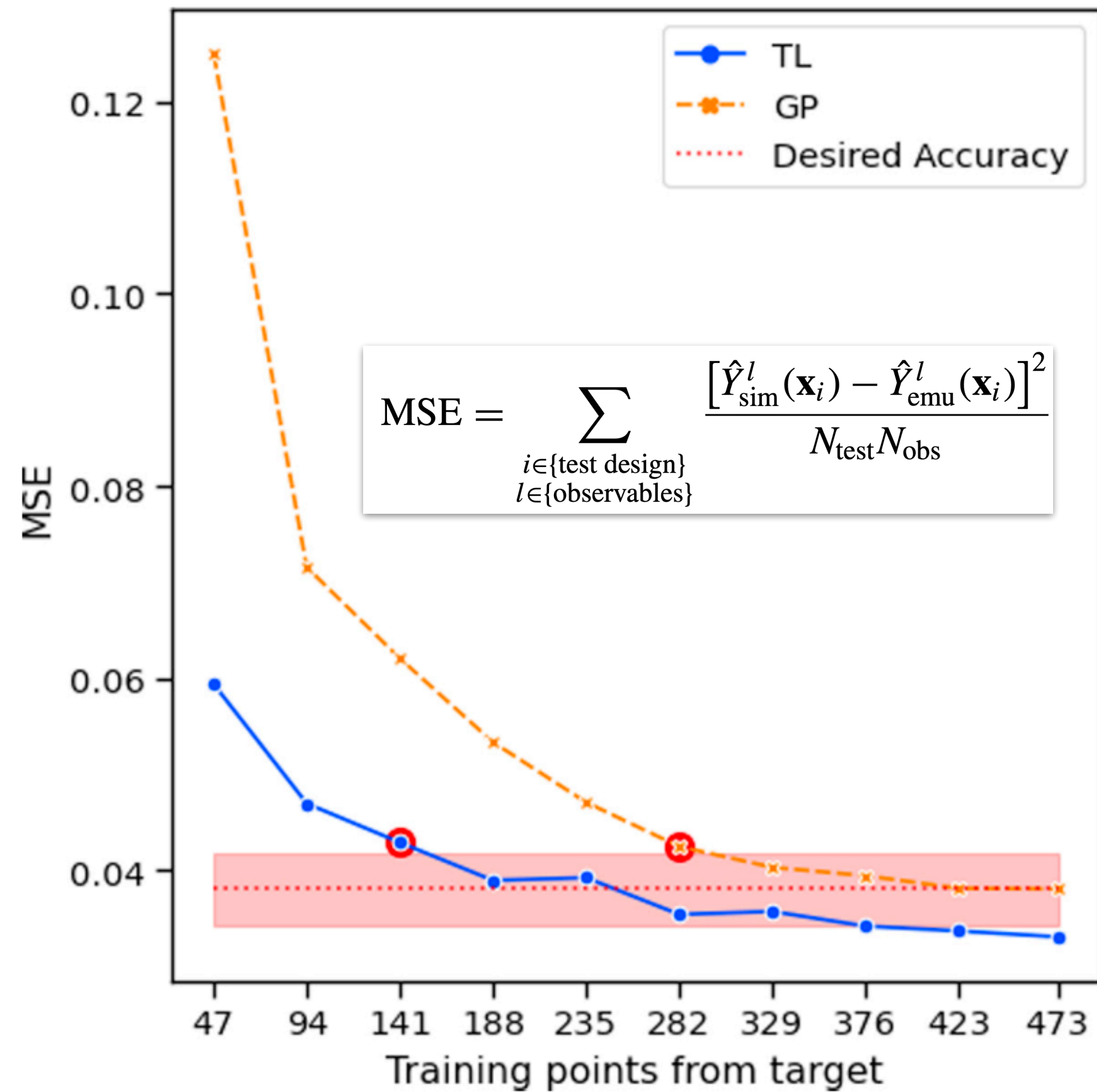
account for model uncertainties



PERFORMANCE

D. Liyanage, Y. Ji, D. Everett, M. Heffernan, U. Heinz, S. Mak, and J.-F. Paquet, PRC 105, 034910 (2022)

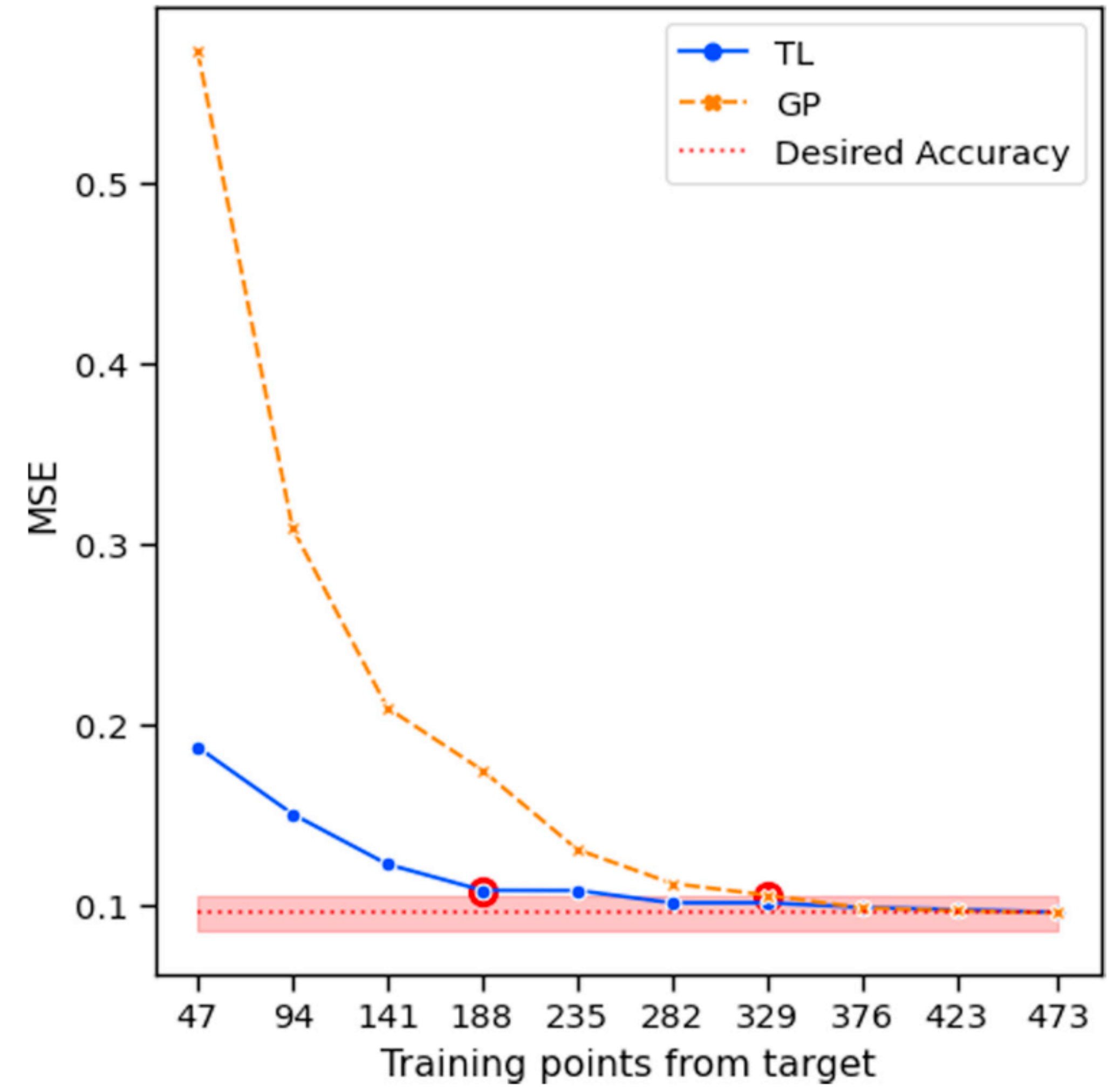
3



Pb+Pb @ 2.76 TeV



Au+Au @ 200 GeV



Grad (2.76 TeV)



Chapman-Enskog (2.76 TeV)

$$[f_T(\mathbf{x}_{\text{new}})|\mathbf{y}_S, \mathbf{y}_T] \sim N(\mu_T^*(\mathbf{x}_{\text{new}}), \sigma_T^{2*}(\mathbf{x}_{\text{new}})), \quad (9)$$

where the posterior mean and variance of the transfer learning emulator model are given by

$$\begin{aligned} \mu_T^*(\mathbf{x}_{\text{new}}) = & \rho\mu_S + \mu_\delta \\ & + \mathbf{k}_{\text{new}}^\top \boldsymbol{\Sigma}^{-1} \left(\begin{bmatrix} \mathbf{y}_S \\ \mathbf{y}_T \end{bmatrix} - \begin{bmatrix} \mu_S \mathbf{1}_m \\ (\rho\mu_S + \mu_\delta) \mathbf{1}_n \end{bmatrix} \right), \end{aligned} \quad (10)$$

$$\begin{aligned} \sigma_T^{2*}(\mathbf{x}_{\text{new}}) = & \rho^2 \mathbf{k}_S(\mathbf{x}_{\text{new}}, \mathbf{x}_{\text{new}}) + \mathbf{k}_\delta(\mathbf{x}_{\text{new}}, \mathbf{x}_{\text{new}}) \\ & - \mathbf{k}_{\text{new}}^\top \boldsymbol{\Sigma}^{-1} \mathbf{k}_{\text{new}}, \end{aligned}$$

with $\mathbf{k}_{\text{new}} = [\mathbf{k}_{\text{new}}^S, \mathbf{k}_{\text{new}}^T]$ and $\mathbf{k}_{\text{new}}^S = [k(\mathbf{x}_{\text{new}}, \mathbf{x}_i)]_{i=1}^m$, $\mathbf{k}_{\text{new}}^T = [k(\mathbf{x}_{\text{new}}, \mathbf{x}_j)]_{j=1}^n$, and

$$\boldsymbol{\Sigma} = \begin{bmatrix} \mathbf{K}_S(\mathbf{X}_S) + \gamma_S^2 \mathbf{I}_m & \rho \mathbf{K}_S(\mathbf{X}_S, \mathbf{X}_T) \\ \rho \mathbf{K}_S(\mathbf{X}_S, \mathbf{X}_T)^\top & \rho^2 \mathbf{K}_S(\mathbf{X}_T) + \mathbf{K}_\delta(\mathbf{X}_T) + \gamma_T^2 \mathbf{I}_n \end{bmatrix}.$$