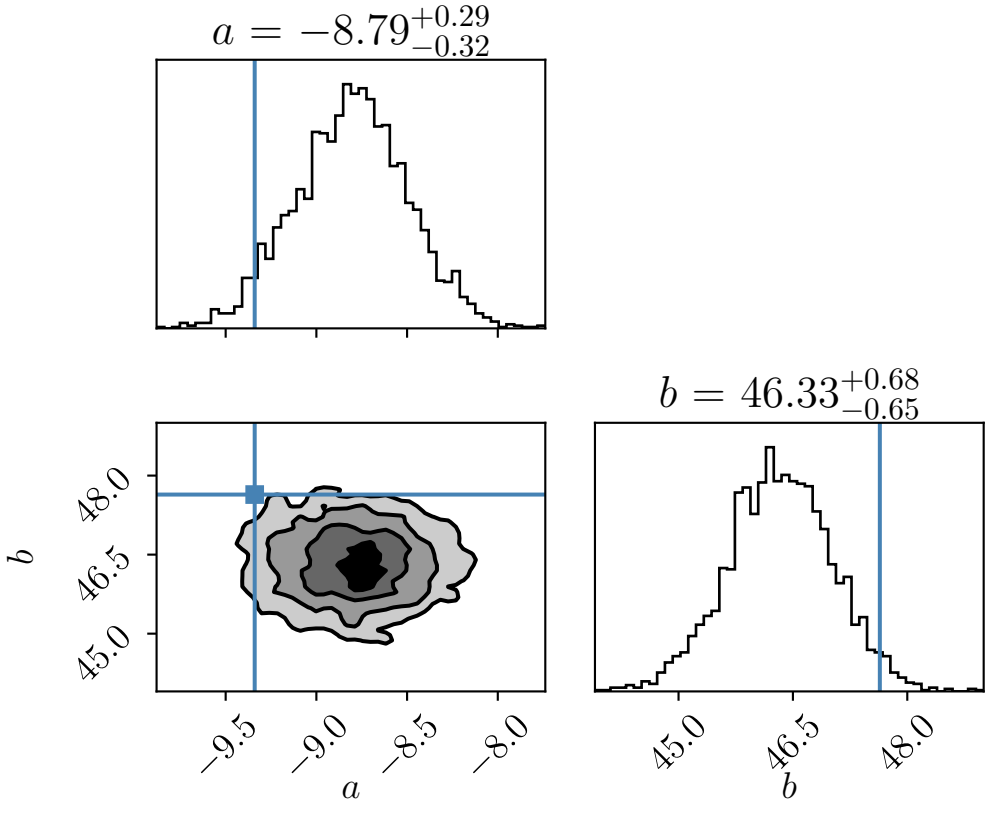
Probability densities and correlations

$p_{\phi(\hat{\mathbf{x}},\hat{\mathbf{y}})}(\boldsymbol{x}|\boldsymbol{y}) \sim \boldsymbol{x} = (x_1, x_2)^\top = (a, b)^\top$