

## Parameter Inference using JAX and numpyro

$$\theta = (\Omega_m, w_0, M_B, \delta M, \alpha, \beta)$$

$$M_B = 5 \log_{10} D_L(z) + M_B + \delta M \odot (M_{\text{stellar}} - 10^0 M_\odot) - \alpha X_1 + \beta C$$

likelihood :  $p(m_B^{(\text{data})} | \theta)$

priors :  $p(\theta) = p(\Omega_m) p(w_0) p(M_B) p(\delta M) p(\alpha) p(\beta)$

→ independent priors

posterior :  $p(\theta | m_B^{(\text{data})}) \propto p(m_B^{(\text{data})} | \theta) p(\theta)$

likelihood                      prior

$$p(m_B^{(\text{data})} | \theta) = \frac{1}{\sqrt{|2\pi C|}} \exp \left[ -\frac{1}{2} (m_B^{(\text{data})} - m_B(\theta))^T C^{-1} (m_B^{(\text{data})} - m_B(\theta)) \right]$$

$C$  : covariance matrix of size  $740 \times 740$

$m_B^{(\text{data})}$  : data vector of size 740

→ Gaussian likelihood.