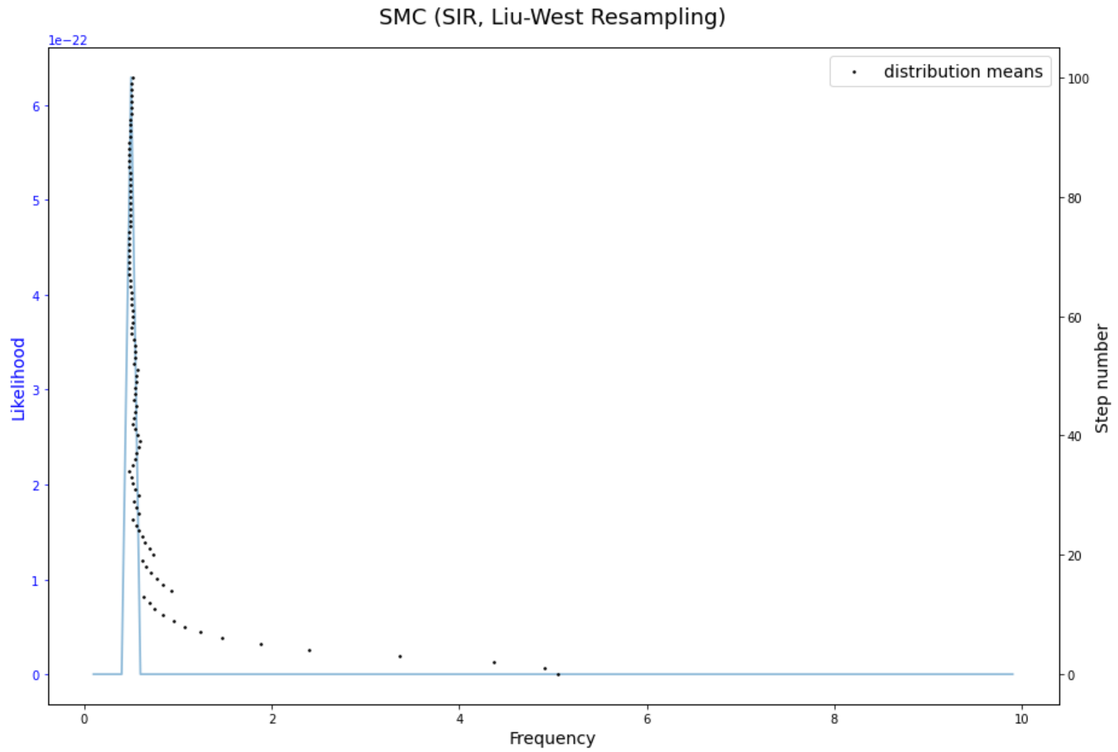
100 particle SMC vs. MCMC (single particle)

(Matched for number of measurements, measurement times, number of steps, real frequency, prior distribution, and constraints)

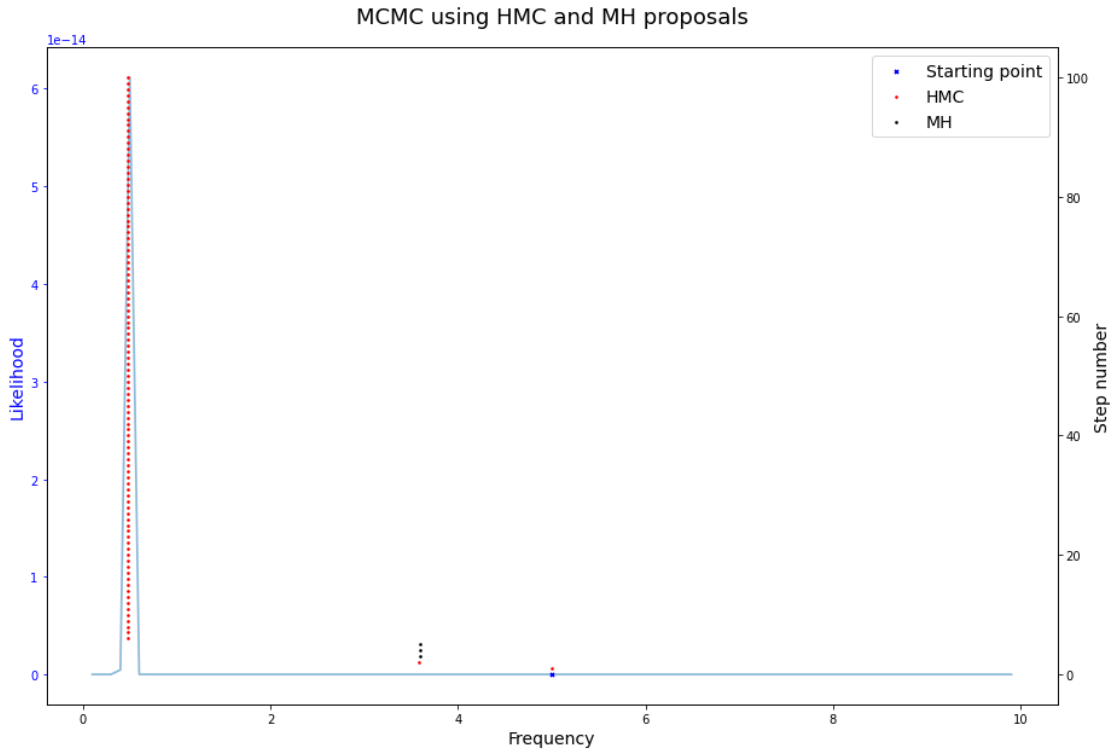
<u>100 particles</u>

(sample from consecutive cumulative products of likelihoods)



<u>1 particle</u>

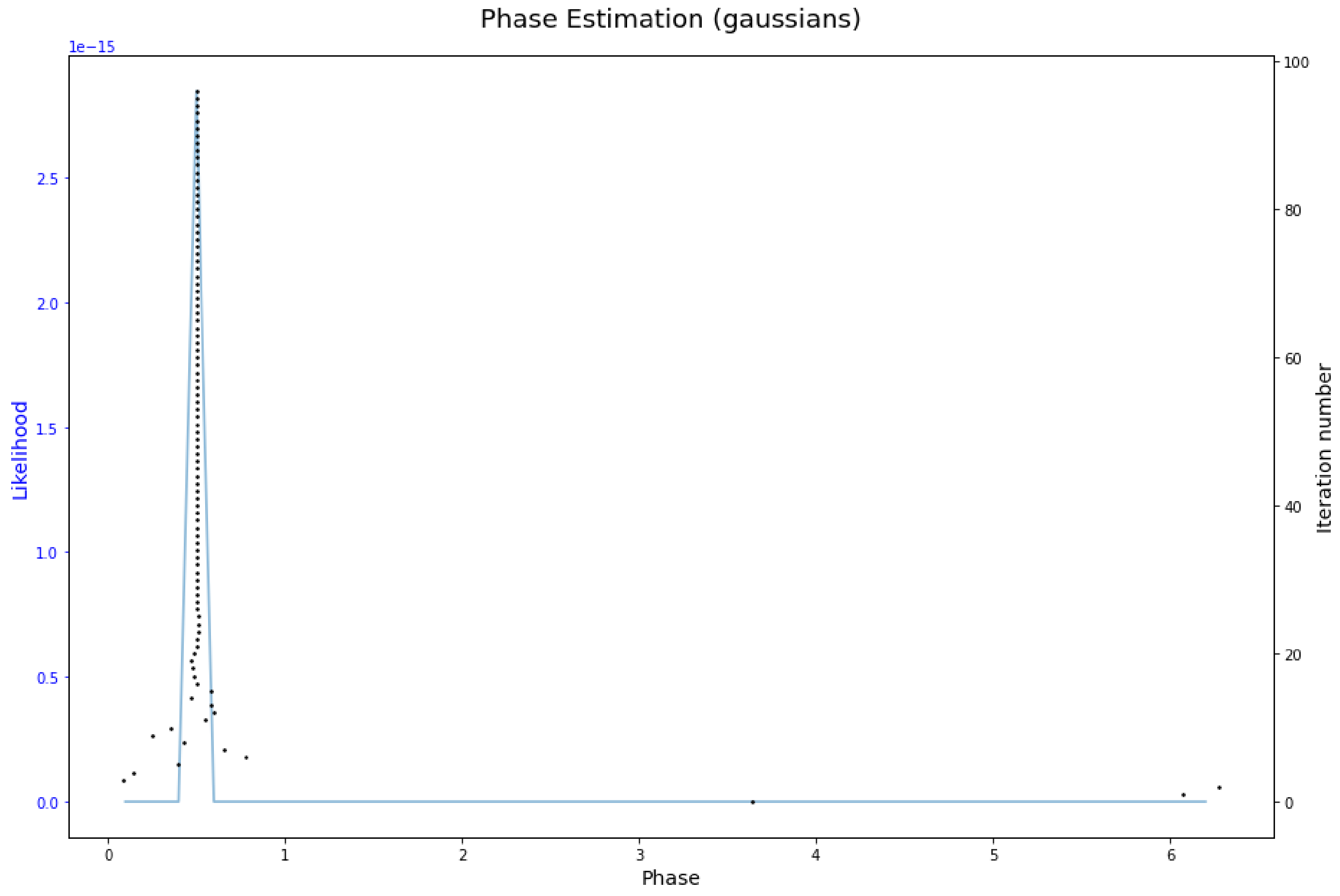
(sample from the product of all likelihoods)



n=1 or 100; N=100; measurements=100; f_max=10

(evolution times chosen offline; increment=0.08)

Phase Estimation



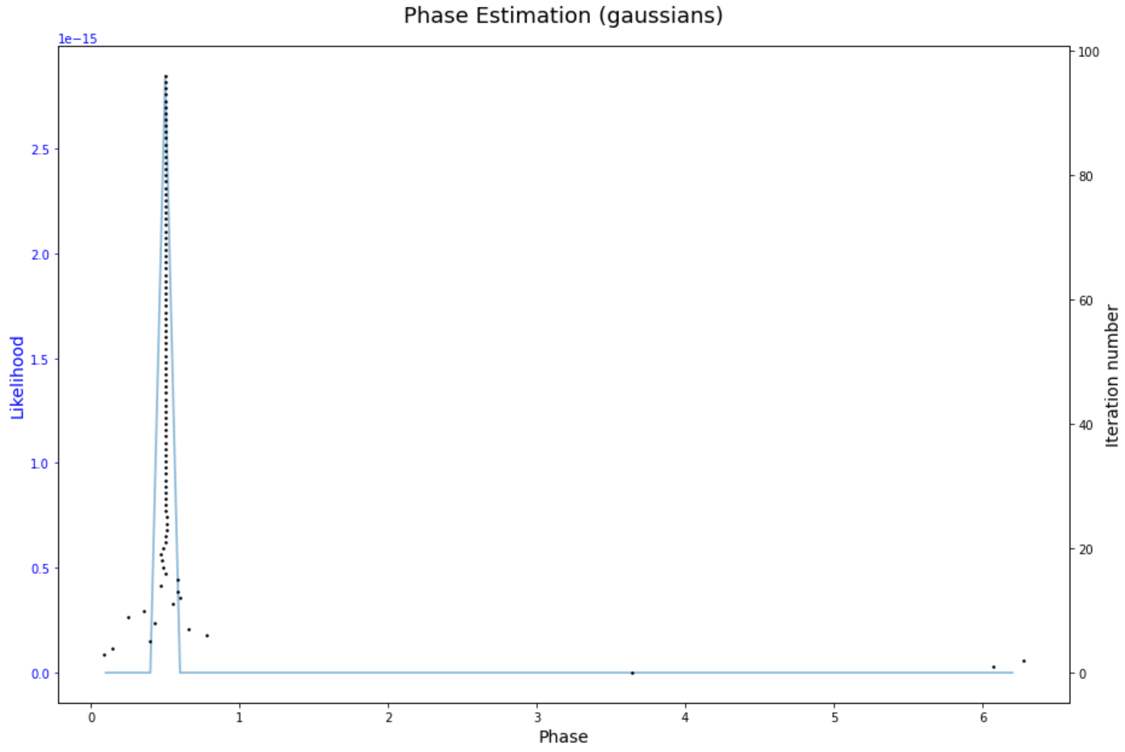
- 100 steps on 100 experiments
- 100 samples per step to approximate the mean and variance
- Start with flat prior on [0,2π[, assume gaussian model for subsequent iterations

Phase Estimation: Gaussians vs. MCMC

(Matched for number of measurements, number of likelihood evaluations, and real phase)

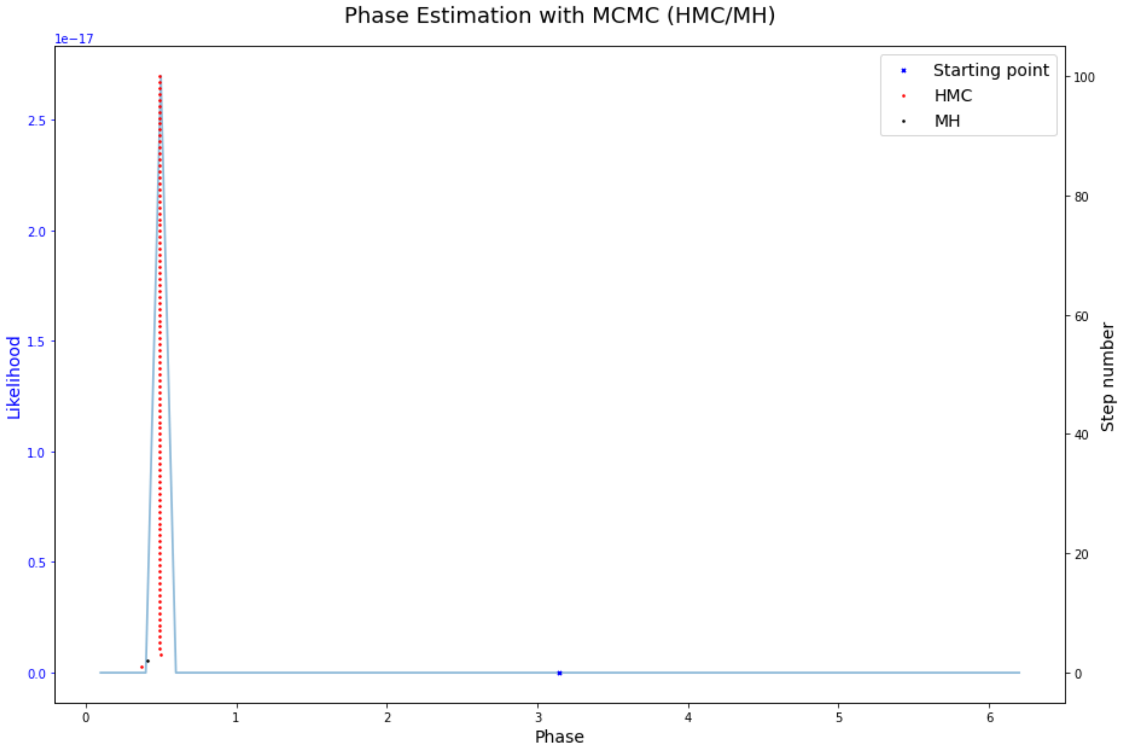
Gaussian distributions, 100 steps × 100 samples

(sample according to single experiment likelihood given latest prior; experiment controls chosen adaptively)



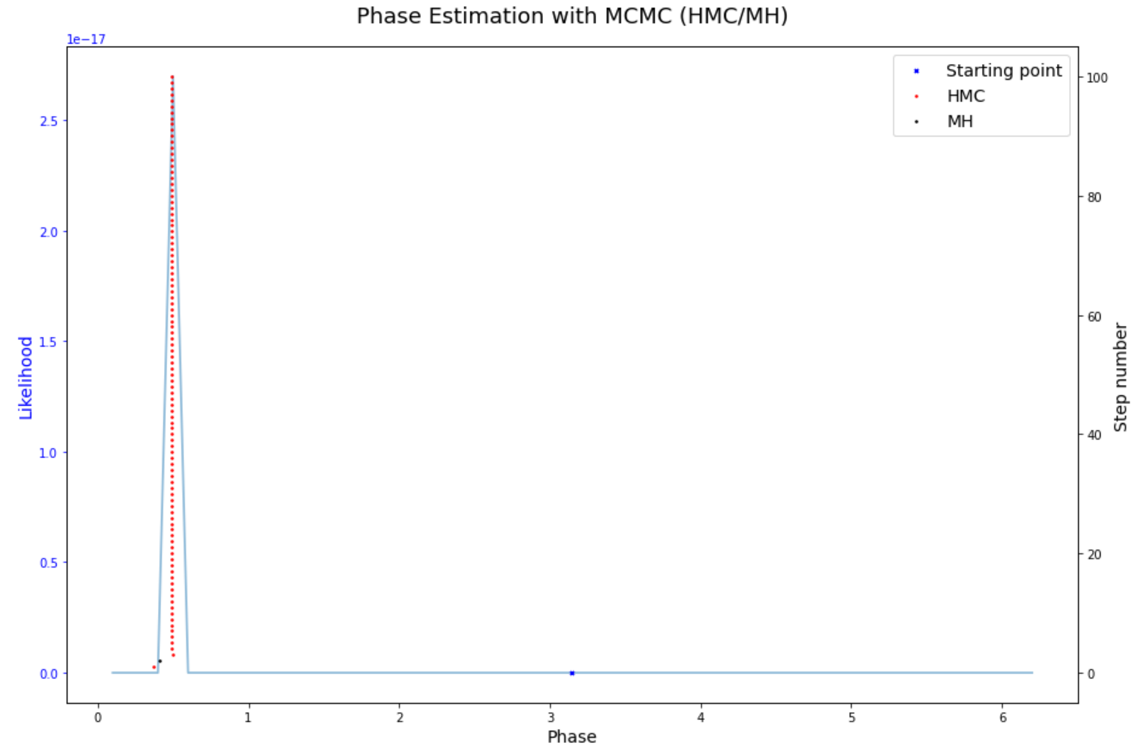
MCMC, 100 steps × 1 particle

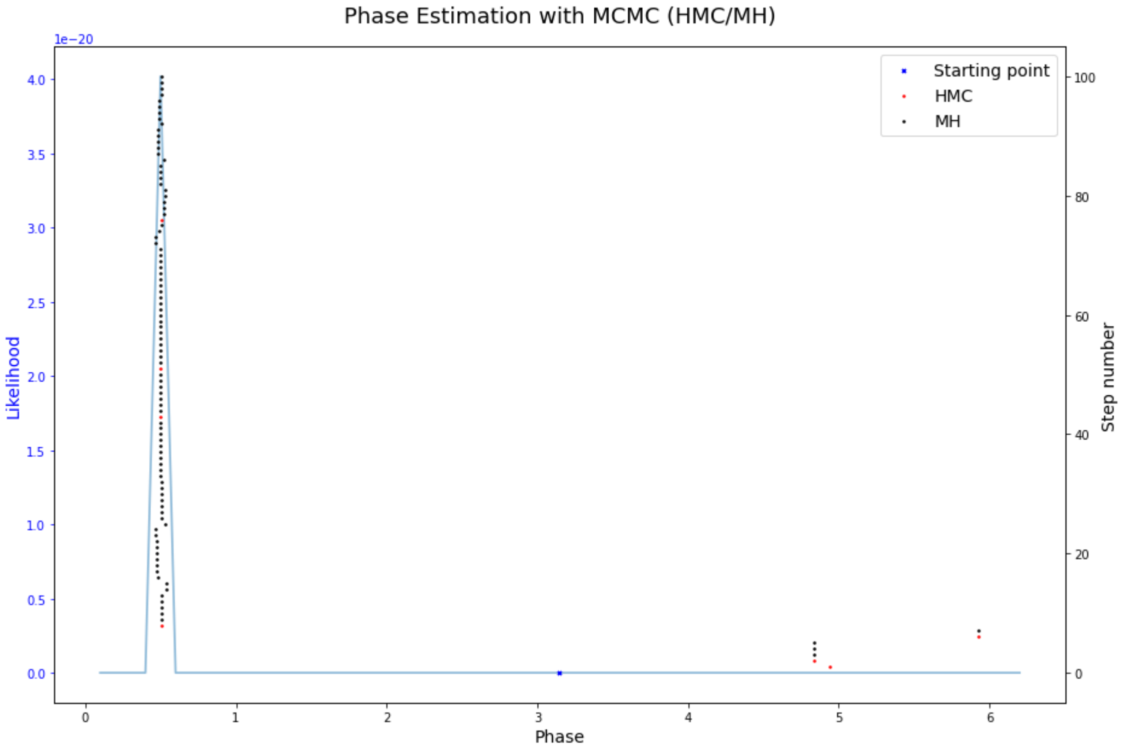
(sample from the product of all likelihoods; experiment controls chosen arbitrarily in advance)*



* *M×theta=[1..11] ×([0..9]*π/5)*
(exluding unusable data at each step)

MCMC Phase Estimation





<u>HMC</u>: m=0.05, L=10, eta=0.0005
MH: gaussian proposals, sigma=0.1
* Percentage of HMC steps: 99%.
* Hamiltonian Monte Carlo: 100% mean particle acceptance rate.
* Metropolis-Hastings: 100% mean particle acceptance rate.

HMC: m=0.5, L=10, eta=0.001
MH: : gaussian proposals , sigma=0.1
* Percentage of HMC steps: 7%.
* Hamiltonian Monte Carlo: 57% mean particle acceptance rate.
* Metropolis-Hastings: 24% mean particle acceptance rate.