

Figure 10. Experiments on 4AA test tetrapeptides AWCK, LYVI and CSFQ (top, middle and bottom rows respectively). Samples were generated via MD, Timewarp exploration (Algorithm 2), and Timewarp MCMC (Algorithm 1). (a) TICA plots of samples. (b) Free energies along the first two TICA components. (c) Potential energy distribution. For AWCK all metastable states are found by all methods, for LYVI the MD trajectory misses one state, and for CSFQ Timewarp MCMC misses the slowest transition. In all cases Timewarp exploration discovers all metastable states.

higher, emphasising the importance of the Metropolis-Hastings correction to obtain unbiased samples from the Boltzmann distribution with the Timewarp model.

B.4. Autocorrelations

In Section 6 we compute the speedup of the Timewarp model by comparing the effective sample sizes per second (Equation (19)) for the slowest transition with MD. As the ESS depends on the autocorrelation, it is also insightful to look at the autocorrelation decay in terms of wall-clock time. We show some example autocorrelations for the investigated peptides in Figures 8, 9 and 11. Note that the area under the autocorrelation curve is inversely proportional to the ESS.

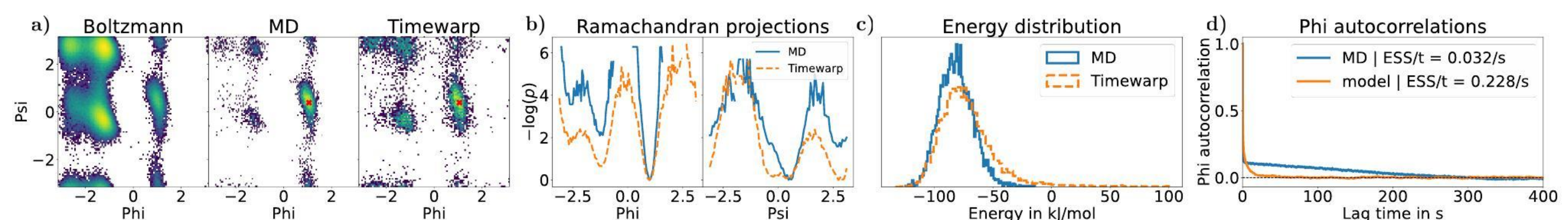


Figure 11. Comparing the conditional Boltzmann distributions generated with MD trajectories and the Timewarp model for alanine dipeptide. (a) Ramachandran plots for the conditional distributions compared with the equilibrium Boltzmann distribution. The red cross indicates the conditioning state. This is similar to the plot shown in Figure 3c, but here showing a different conditioning state. The match between the conditional distributions is not as close here as it is for Figure 3c, which could be because here the conditioning state is chosen to be in the less likely metastable state. (b) Projections on the first two dihedral angles for the conditional distributions. (c) Potential energies of the conditional distributions. (d) Autocorrelations for samples generated according to the MCMC algorithm (Algorithm 1) compared with a long MD trajectory. Note that this autocorrelation plot is not for the conditional distribution, but corresponds to the results shown in Figure 3.