Cumulative distributions AdamOptimizer QNGOptimizer  $\beta_1$ =0.9,  $\beta_2$ =0.99,  $\varepsilon$ =10<sup>-8</sup> approx='block-diag',  $\lambda$ =0.5 1.0  $\eta = 0.01$ -n=0.01n = 0.9 $\eta = 2.25$  $\eta = 0.05$  $\eta = 0.1$  $\eta = 1$  $\eta = 2.5$ Probability of occurrence  $\eta = 0.1$ 0.8  $\eta = 1.1$  $\eta = 0.2$  $\eta = 2.75$  $\eta = 0.2$  $\eta = 1.2$  $\eta = 0.3$  $\eta = 3$  $\eta = 0.3$  $\eta = 1.3$  $\eta = 0.4$  $\eta = 3.25$  $\eta = 0.4$  $\eta = 1.4$  $\eta = 0.5$  $\eta = 3.5$ 0.6  $\eta = 0.5$  $\eta = 1.5$  $\eta = 0.75$  $\eta = 3.75$  $\eta = 1.6$  $\eta = 4$  $\eta = 0.6$  $\eta=1$  $\eta = 0.7$  $\eta = 1.7$  $\eta = 1.25$  $\eta = 4.25$ 0.4  $\eta = 0.8$  $\eta = 1.5$  $\eta = 4.5$  $\eta = 1.75$  $\eta = 4.75$  $\eta=2$  $\eta = 5$ 0.2 (a) (b) 0.0 MomentumQNGOptimizer MomentumOptimizer  $\rho$ =0.9, approx='block-diag',  $\lambda$ =0.5  $\rho = 0.9$ 1.0  $\eta = 0.01$  $\eta = 0.6$  $\eta = 0.01$  $\eta = 0.75$  $\eta = 0.7$  $\eta = 0.05$  $\eta = 0.1$  $\eta = 1$ Probability of occurrence  $\eta = 0.1$  $\eta = 0.8$  $\eta = 0.2$  $\eta = 1.25$ 0.8 n = 0.2 $\eta = 0.9$ n = 0.3 $\eta = 1.5$  $\eta = 1$ n = 0.3n = 0.4n = 1.75 $\eta = 0.4$  $\eta = 1.1$  $\eta = 0.5$ 0.6  $\eta = 0.5$  $\eta = 1.2$ 0.4 0.2 (c) (d) 0.0 0.2 0.2 0.0 0.4 0.6 0.8 0.0 0.4 0.6 0.8 1.0 1.0 delta energy delta energy