

# Report 5: Quantum Monte Carlo

Git: <https://github.com/simonblaue/MCP-Ex5.git>

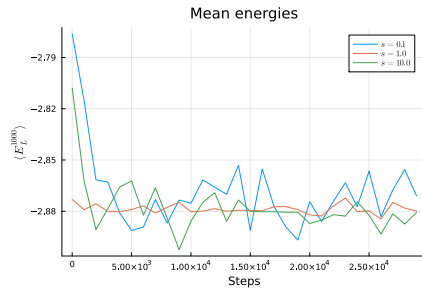
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# 1 Variational Monte Carlo simulation of a Helium atom

## 1.1 Investigate stepsize $s$

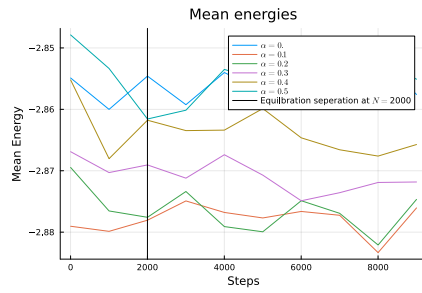


(a) Energies

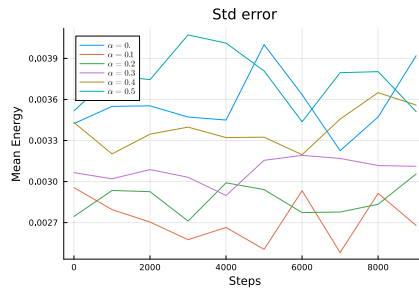


(b) Stds

## 1.2 Approximating equilibration time

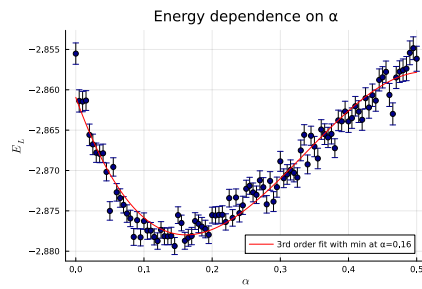


(a) Energies

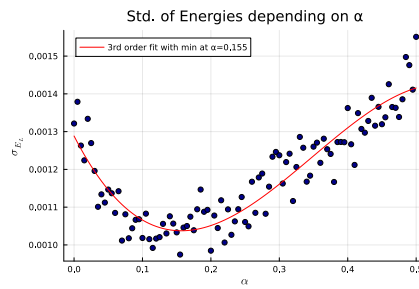


(b) Stds

## 1.3 Investigate variational parameter $\alpha$

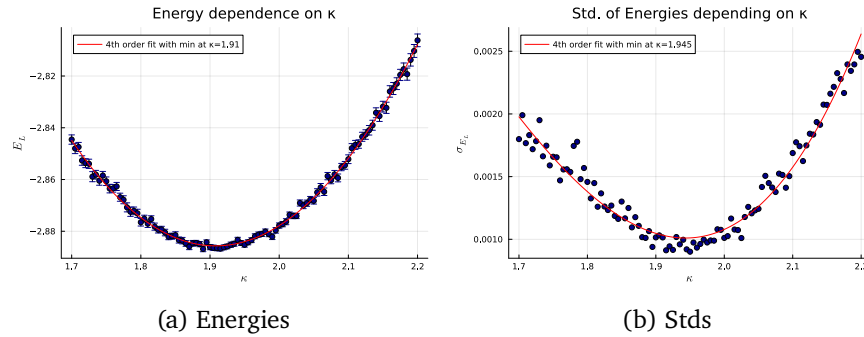


(a) Energies



(b) Stds

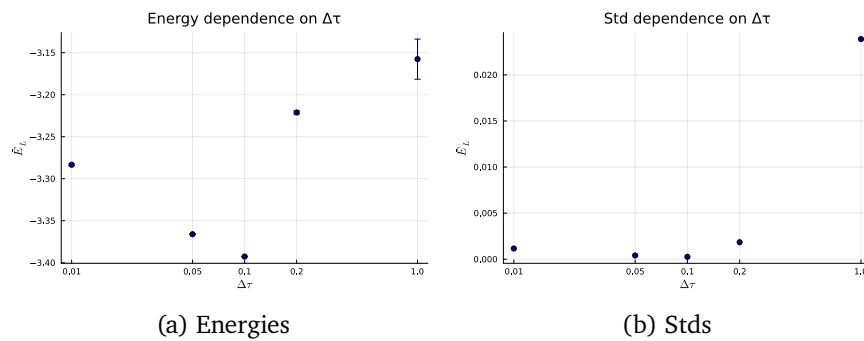
## 1.4 Investigate variational Parameter $\kappa$



## 1.5 Optimizing parameters $\alpha$ , $\beta$ and $\kappa$

Strange stuff happens, optimizing for minimal energie leads to a lower energie as with given params, but higher std...

## 2 Variational Monte Carlo with Fokker-Plank support



### 2.1 Quantum force

### 2.2 Investigate variational parameter $\Delta\tau$

### 2.3 Electron density

## 3 Diffusion Monte Carlo simulation of a Helium atom

## 4 Feynman Path Integral Quantum Mechanics