

# Progress Summary

Mar 31st 2023

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## Simulators:

- **Statevector\_simulator** (ideal, deem the system at a big matrix and calculate with all the info)
- **Aer\_simulator** (real, measure and sample the qubit system for each iteration)

## Initial Conditions:

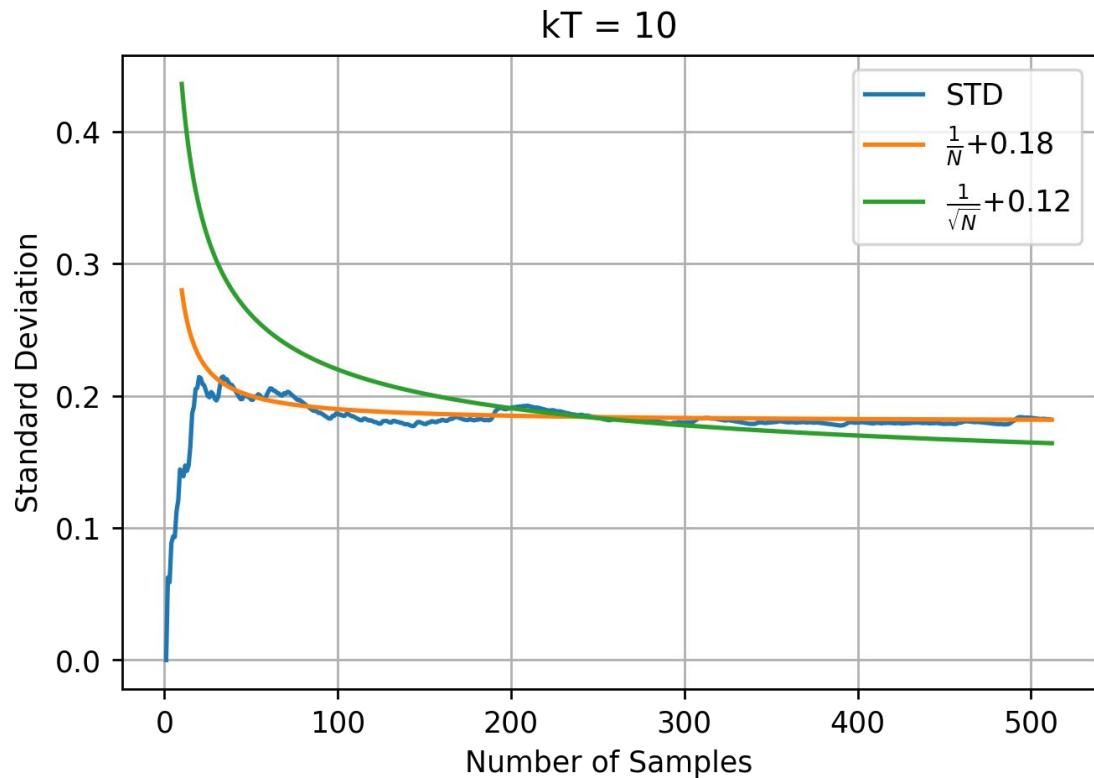
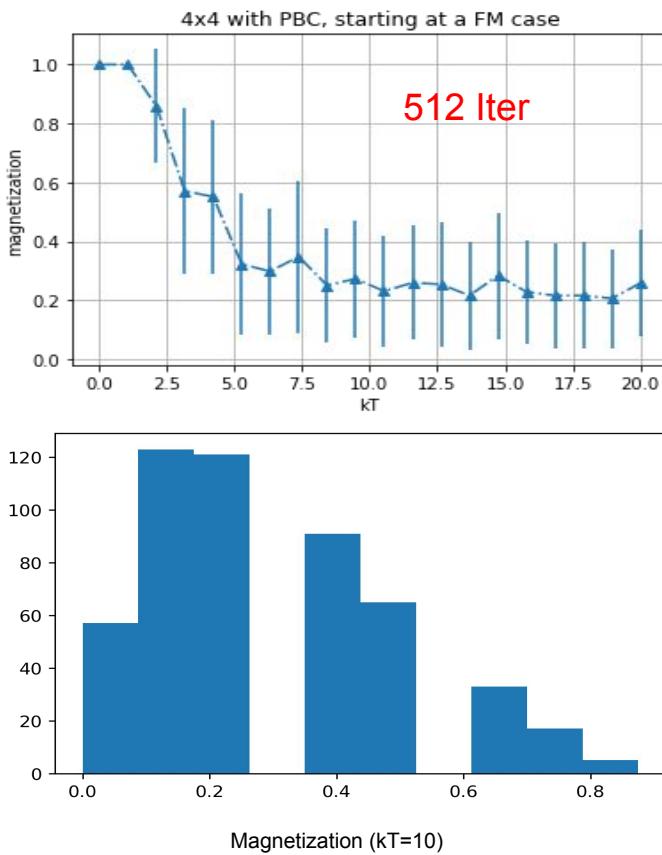
- **FM**: all spin down
- **Random**: randomly assign spin ups

```
# Random ensemble average
temps = np.linspace(0.01, 40, 2)
starting_point = []
mag_values = []
std_values = []
execution_time = []
number_sites = []
for temp in temps:
    info = get_2d_qc(spin,temp)
    random_lat = QuantumCircuit(spin+4, spin)

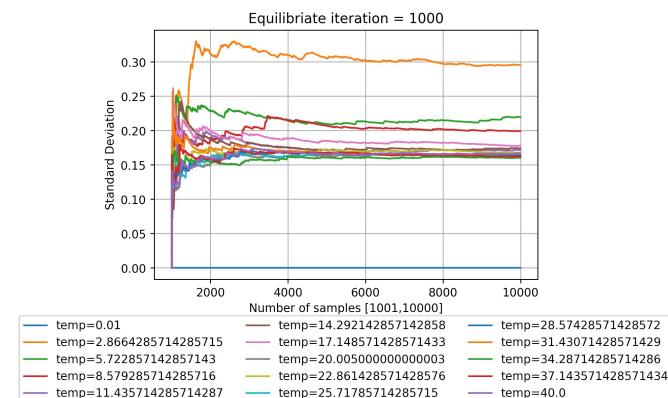
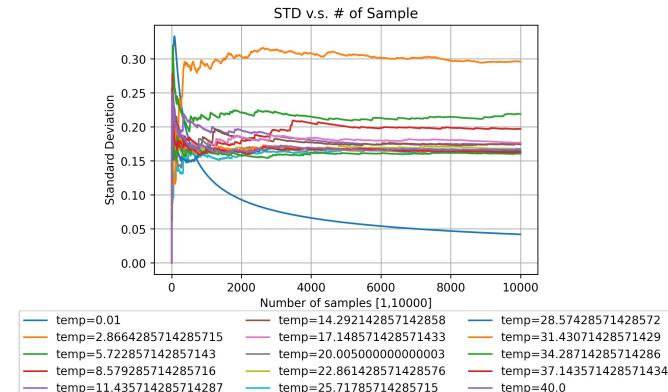
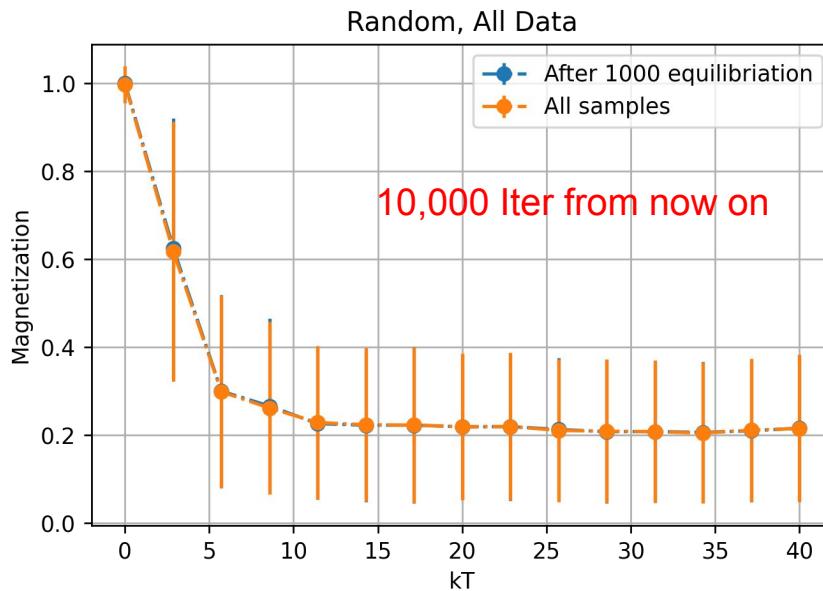
    # random here
    sites = np.arange(0,16).tolist()
    k = random.randint(1, 16)
    sites_up = random.sample(sites, k)
    for site in sites_up:
        random_lat.x(site)

    # equilibrium run : 10000
    states, mag, times = MC_sweep_2D(random_lat, 10, info, sim)
    number_sites.append(k)
```

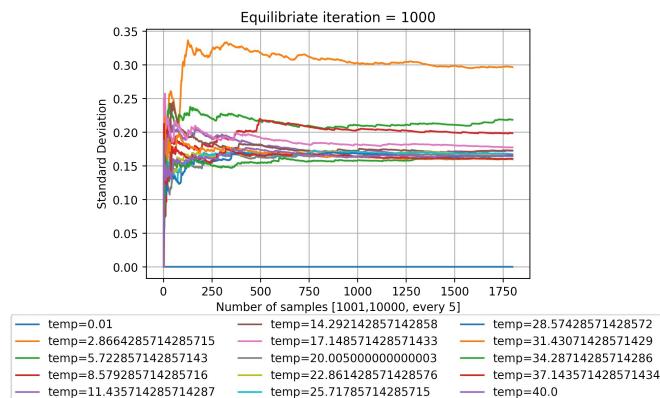
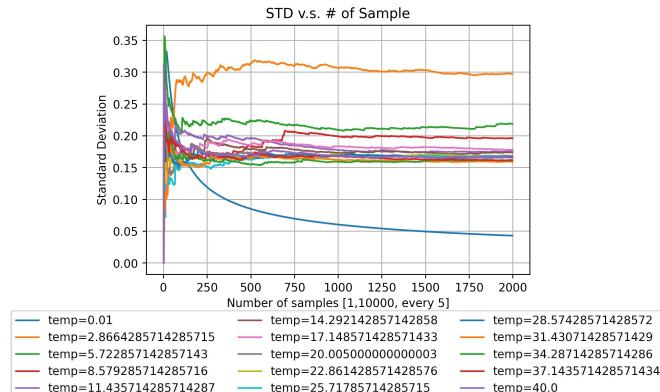
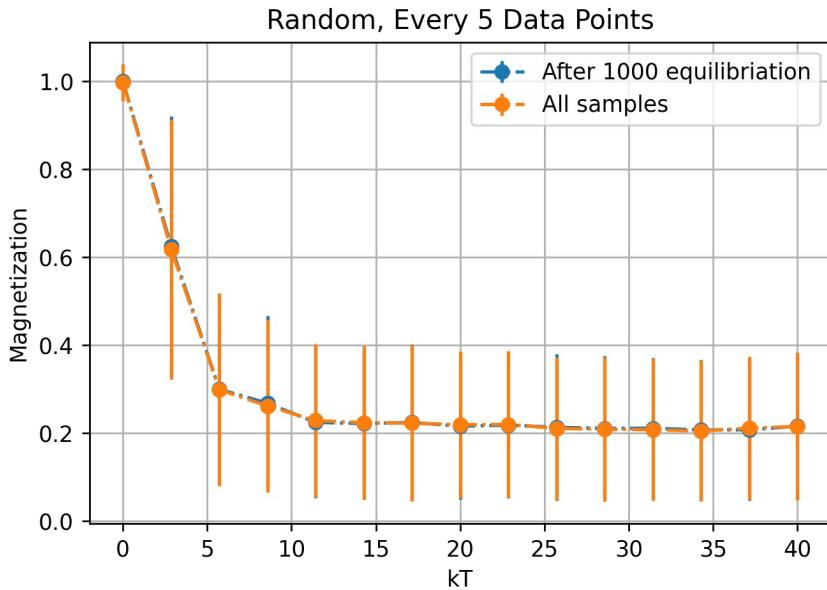
# Statevector, FM starting point:



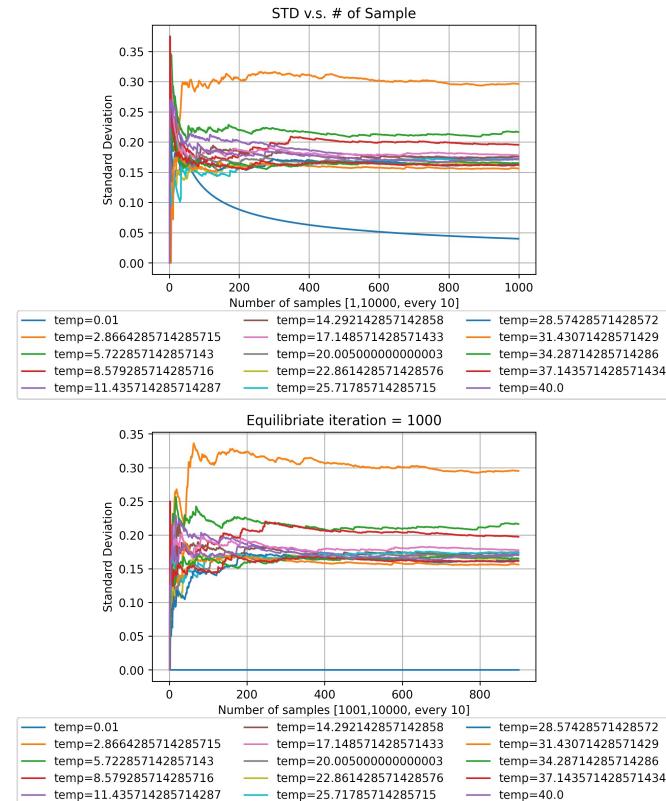
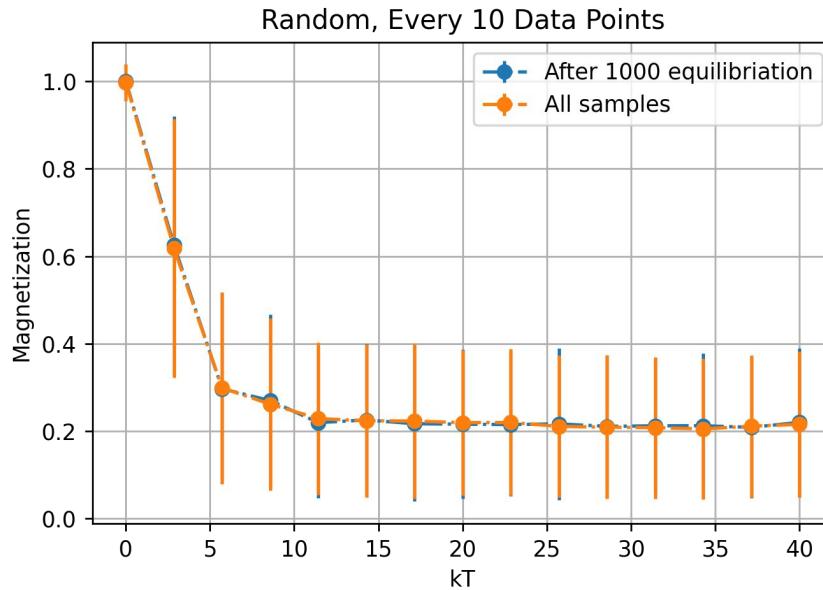
# Statevector: Random starting point



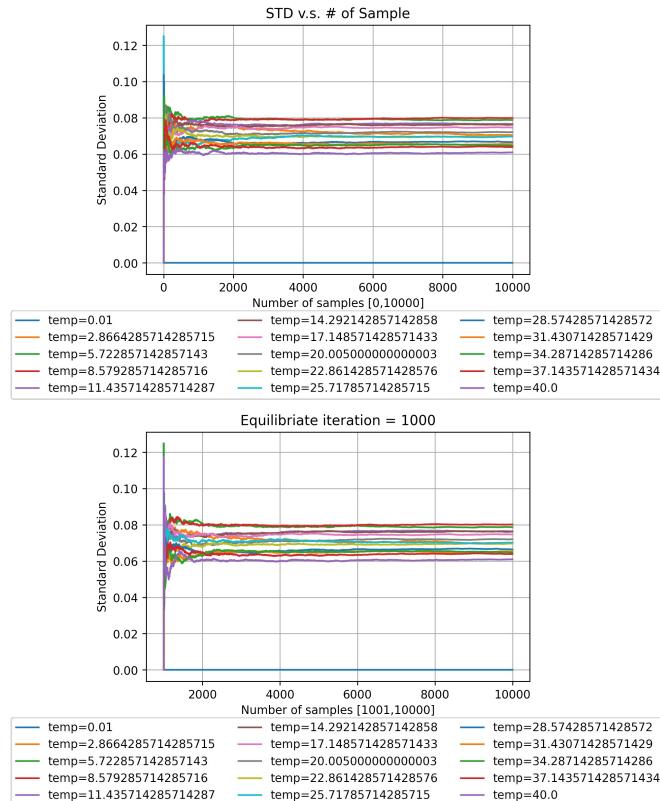
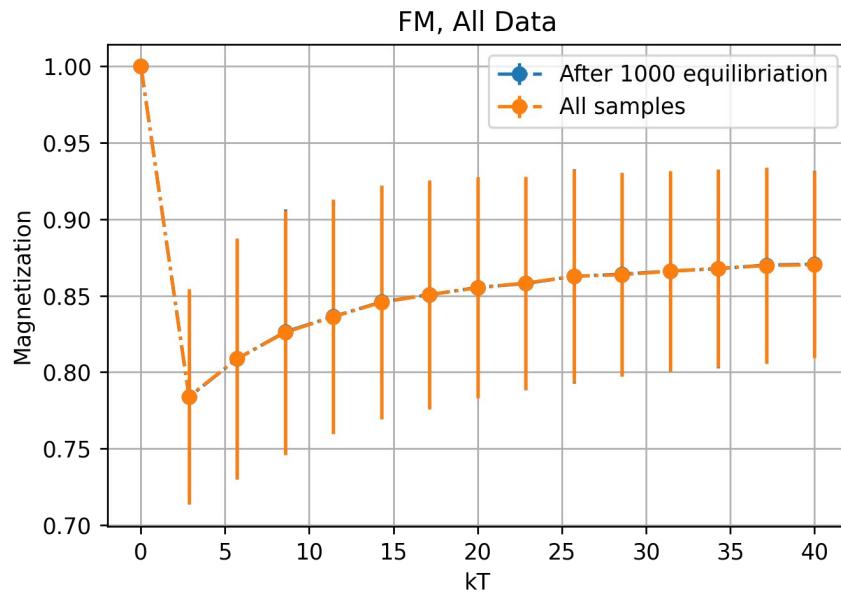
# Statevector: Random starting point (Relax for 5 iter's)



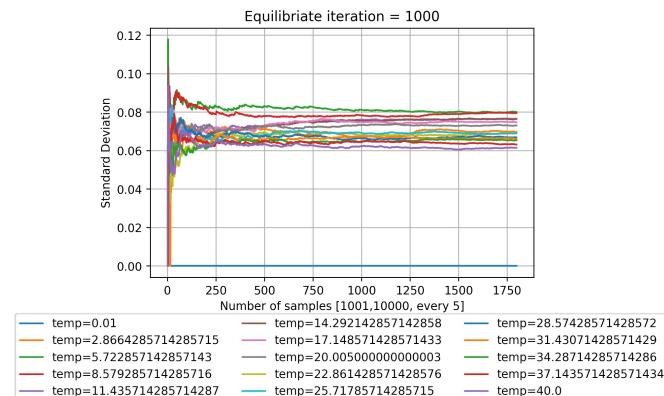
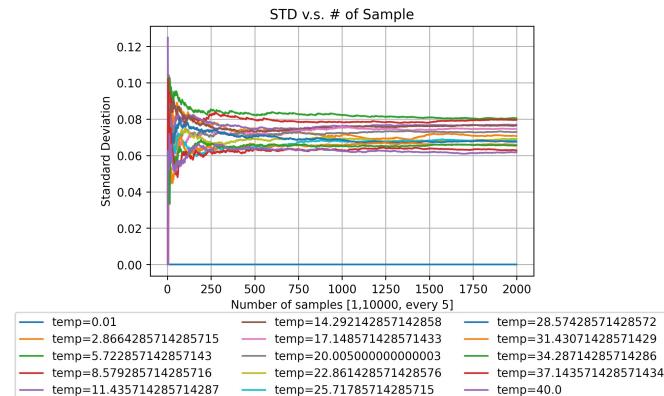
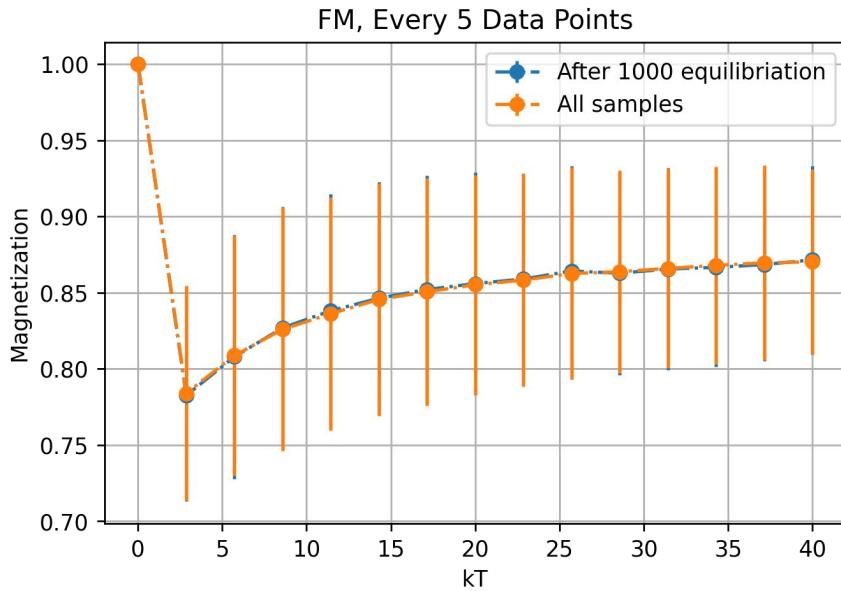
# Statevector: Random starting point (Relax for 10 iter's)



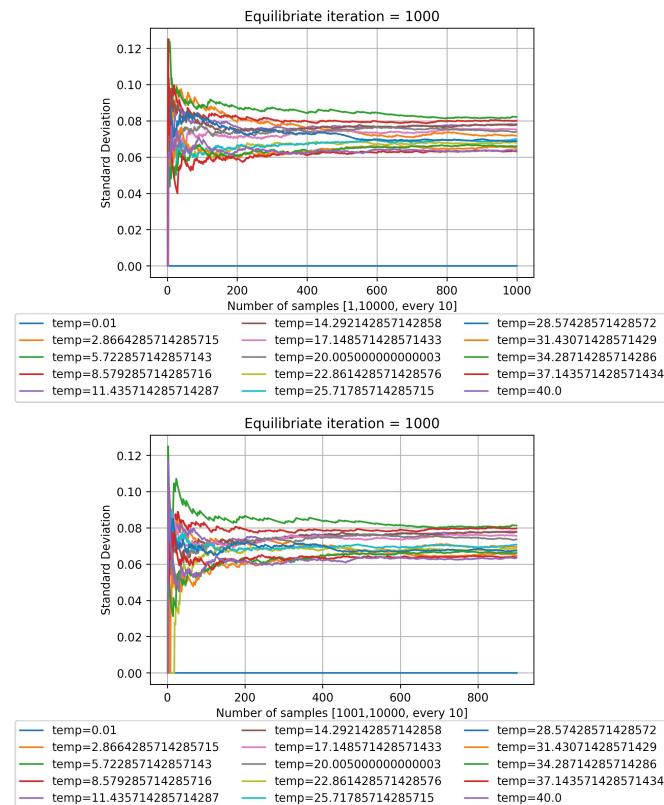
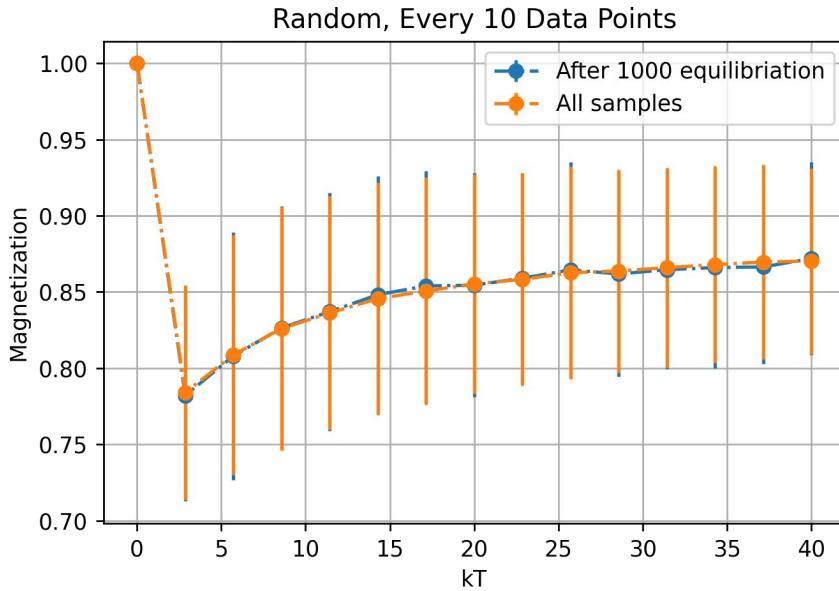
# Aer\_simulator: FM starting point (*weird thing starts happening*)



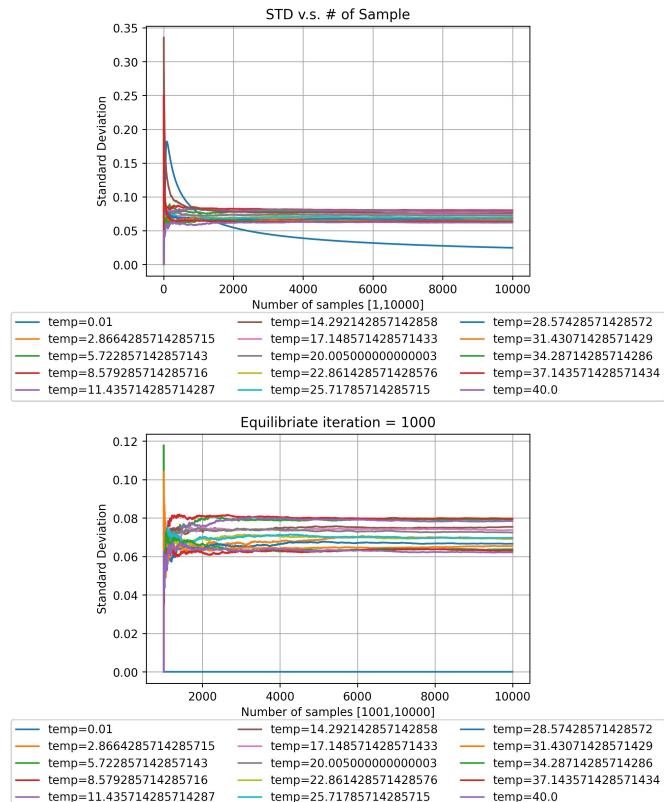
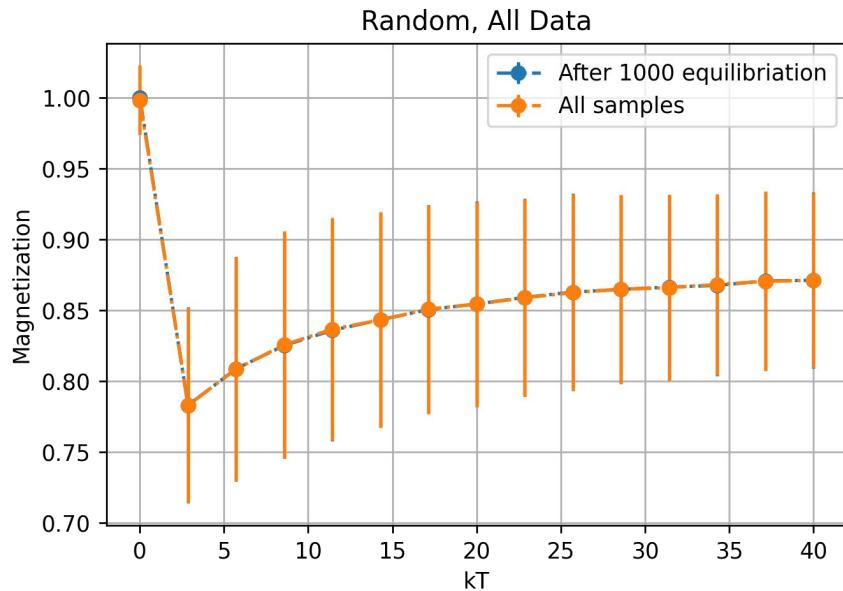
# Aer\_simulator: FM starting point (Relax for 5 iter's)



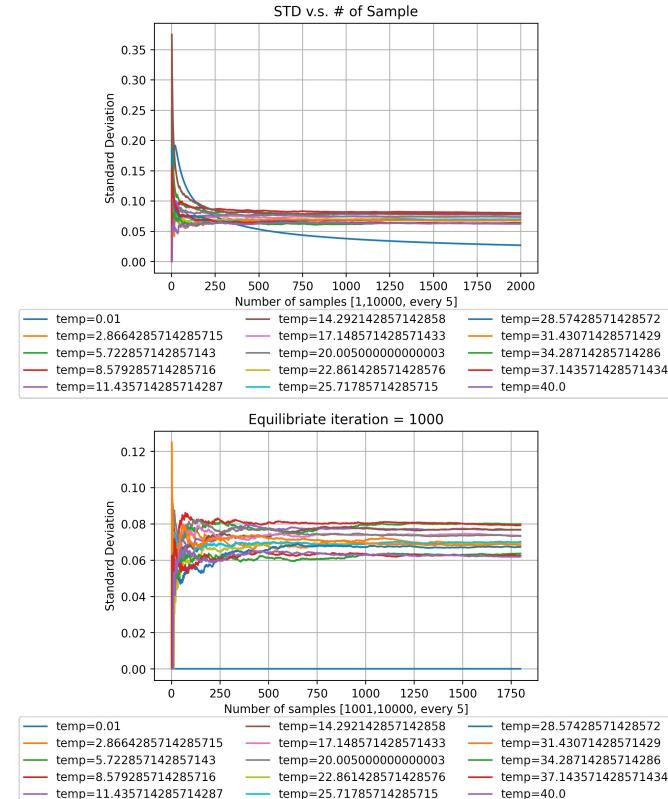
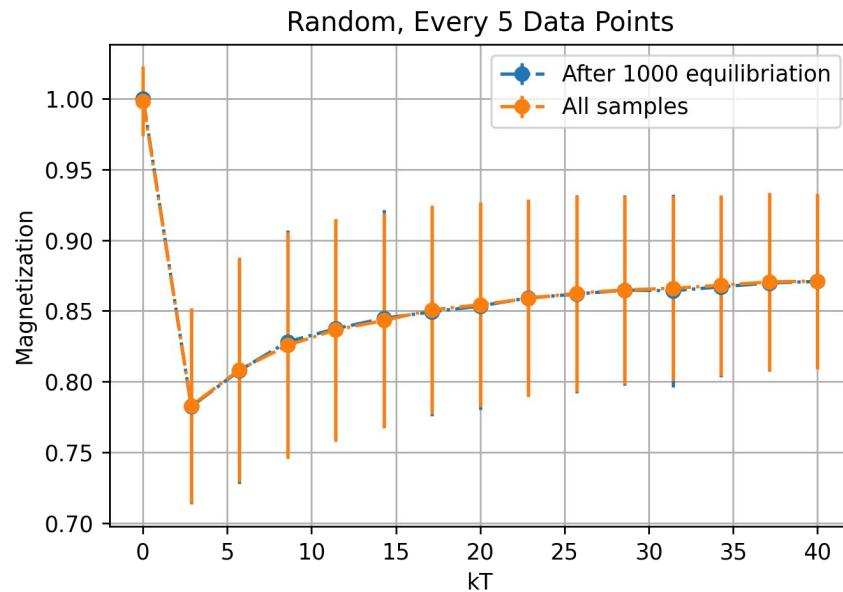
# Aer\_simulator: FM starting point (Relax for 10 iter's)



# Aer\_simulator: Random starting point



# Aer\_simulator: Random starting point (Relax for 5 iter's)



# Aer\_simulator: Random starting point (Relax for 10 iter's)

