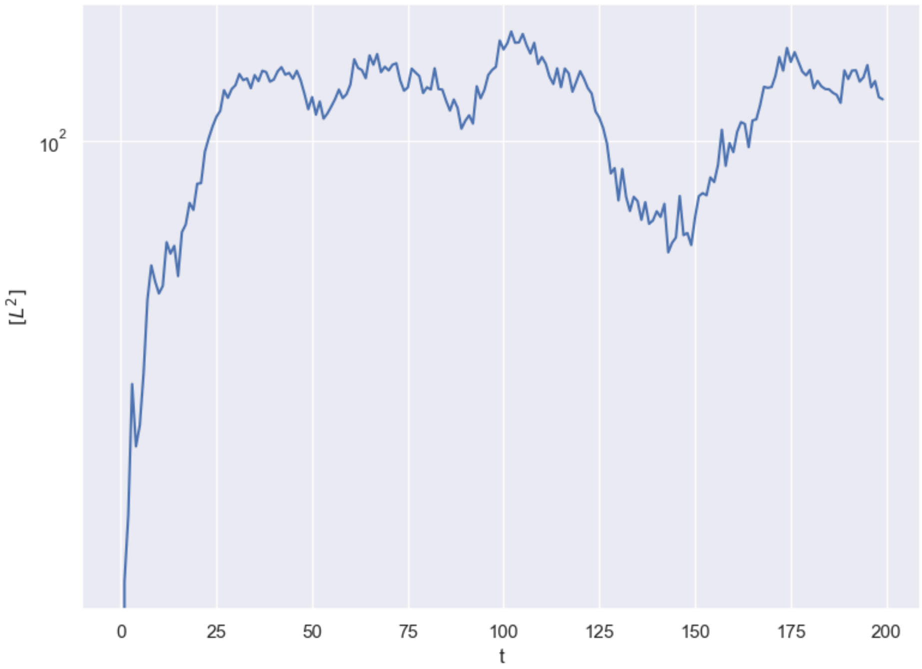
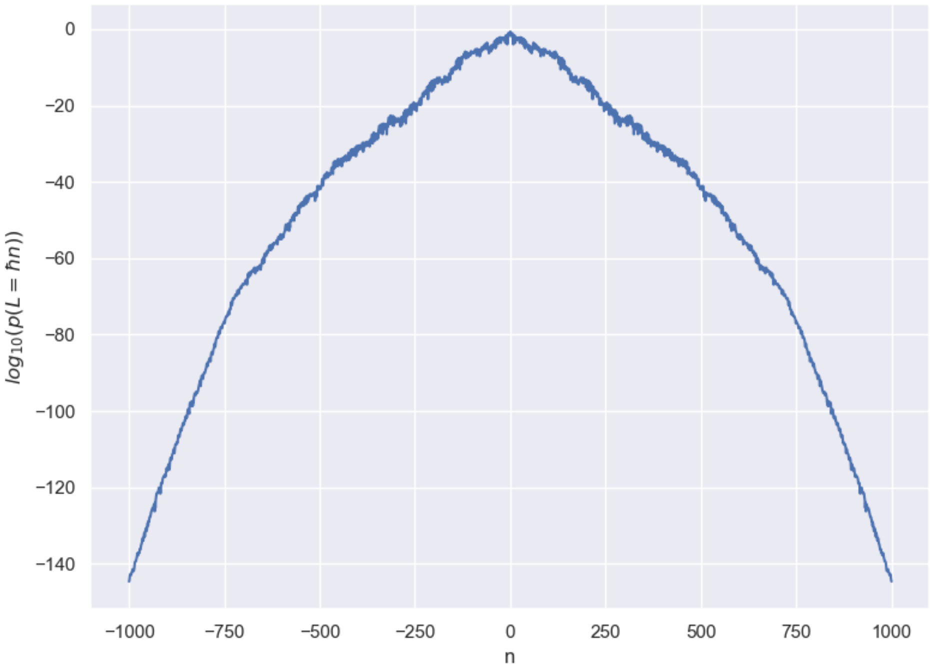
Localization in Quantum Kicked Rotor

Aditya Chincholi

Kicked Quantum Rotor [k=5.0, tau=1, DIM=2001, T=200]

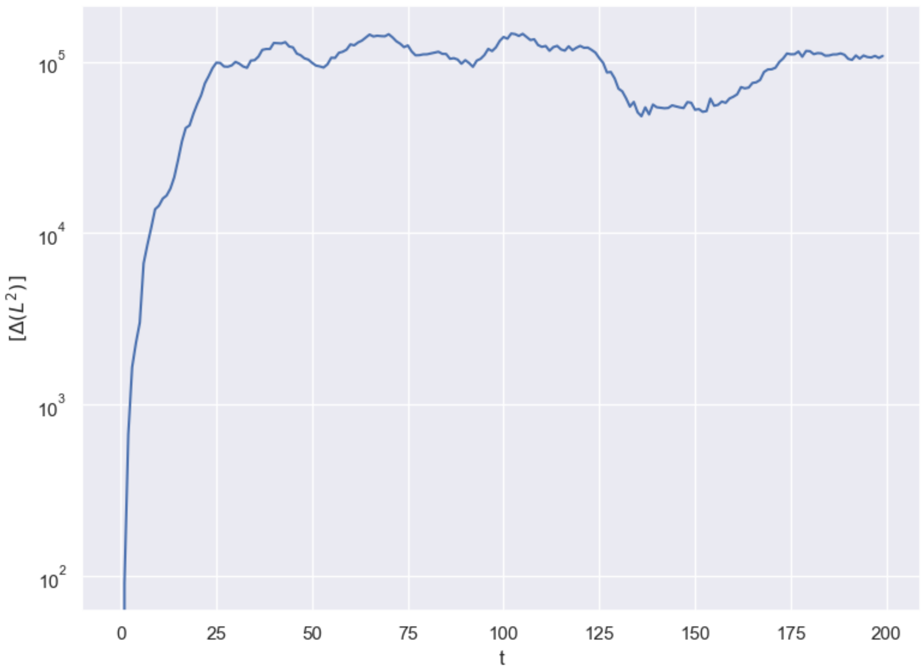
Expectation Value of L^2 with Time





Probability distribution of L values at the end of the simulation.

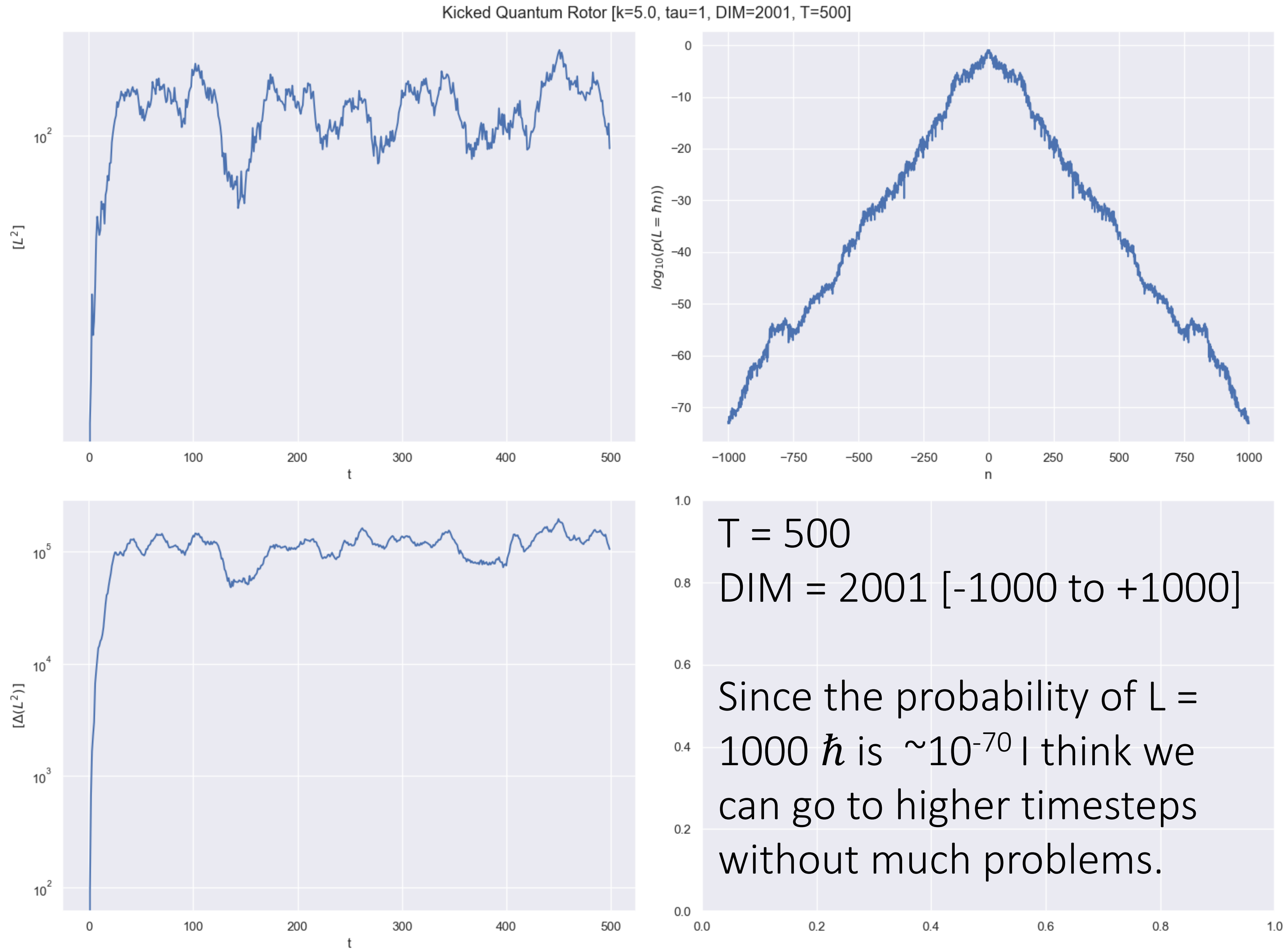
Variance of the L^2 distribution with Time



T = 200

DIM = 2001 [-1000 to +1000]

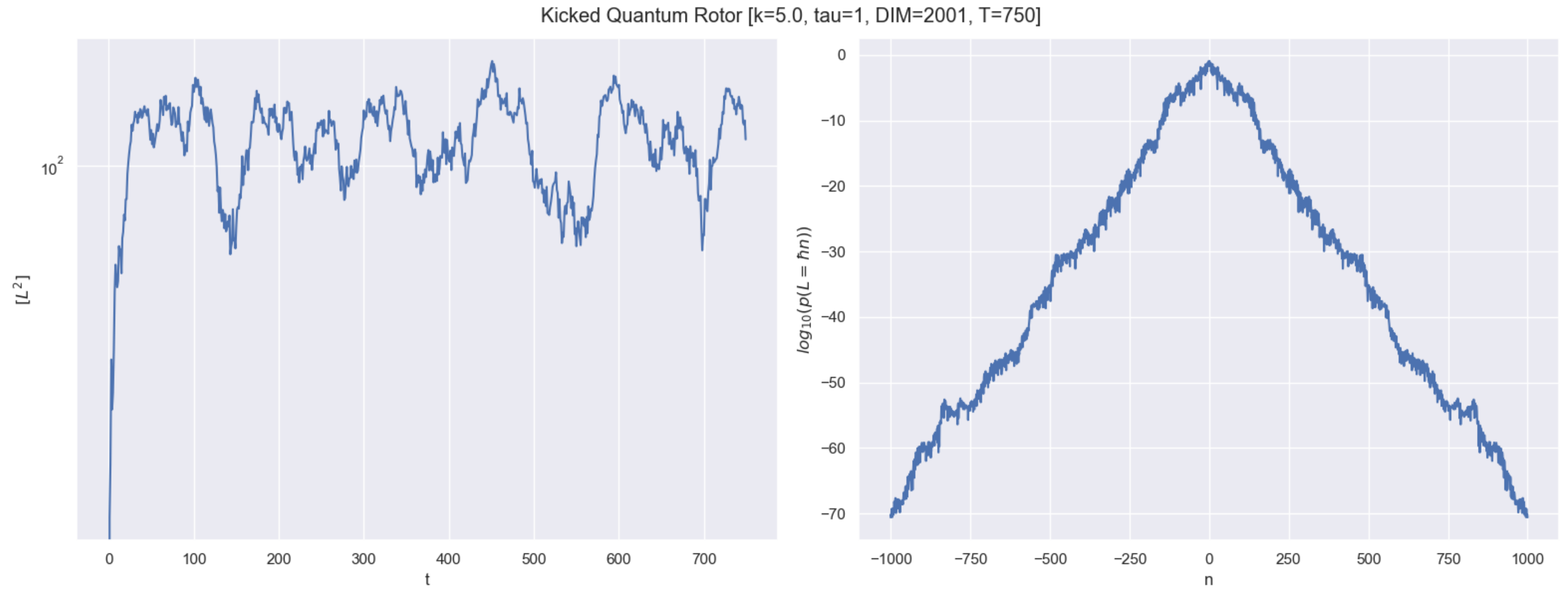
Since the probability of L = 1000 $\hbar$ is ~10^{-140} I think we can go to higher timesteps without much problems.

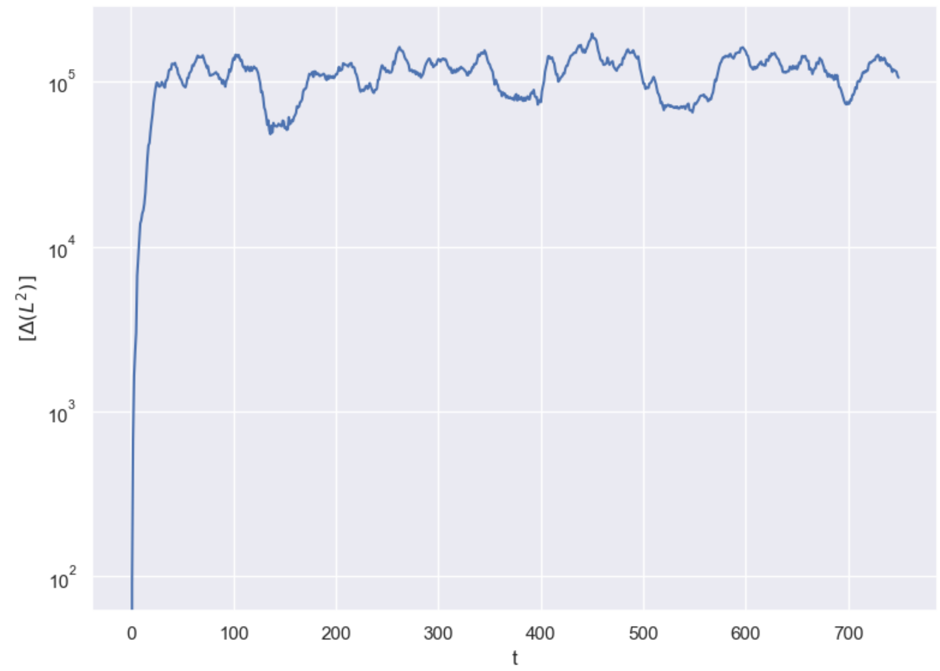


T = 500

DIM = 2001 [-1000 to +1000]

Since the probability of L = 1000 $\hbar$ is ~10^{-70} I think we can go to higher timesteps without much problems.



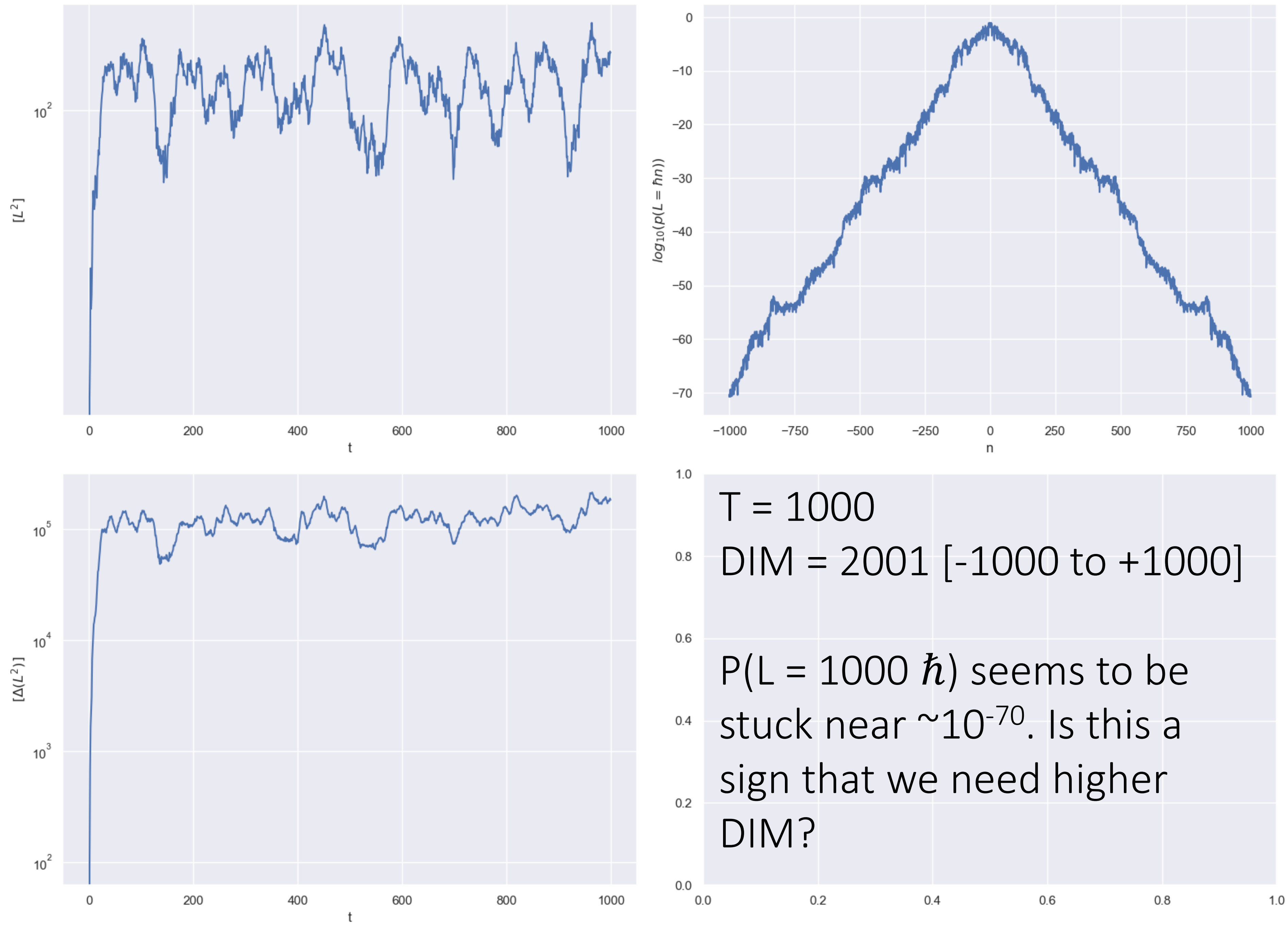


T = 750

DIM = 2001 [-1000 to +1000]

Since the probability of L = 1000 $\hbar$ is ~10^{-70} I think we can go to higher timesteps without much problems. (Can we?)

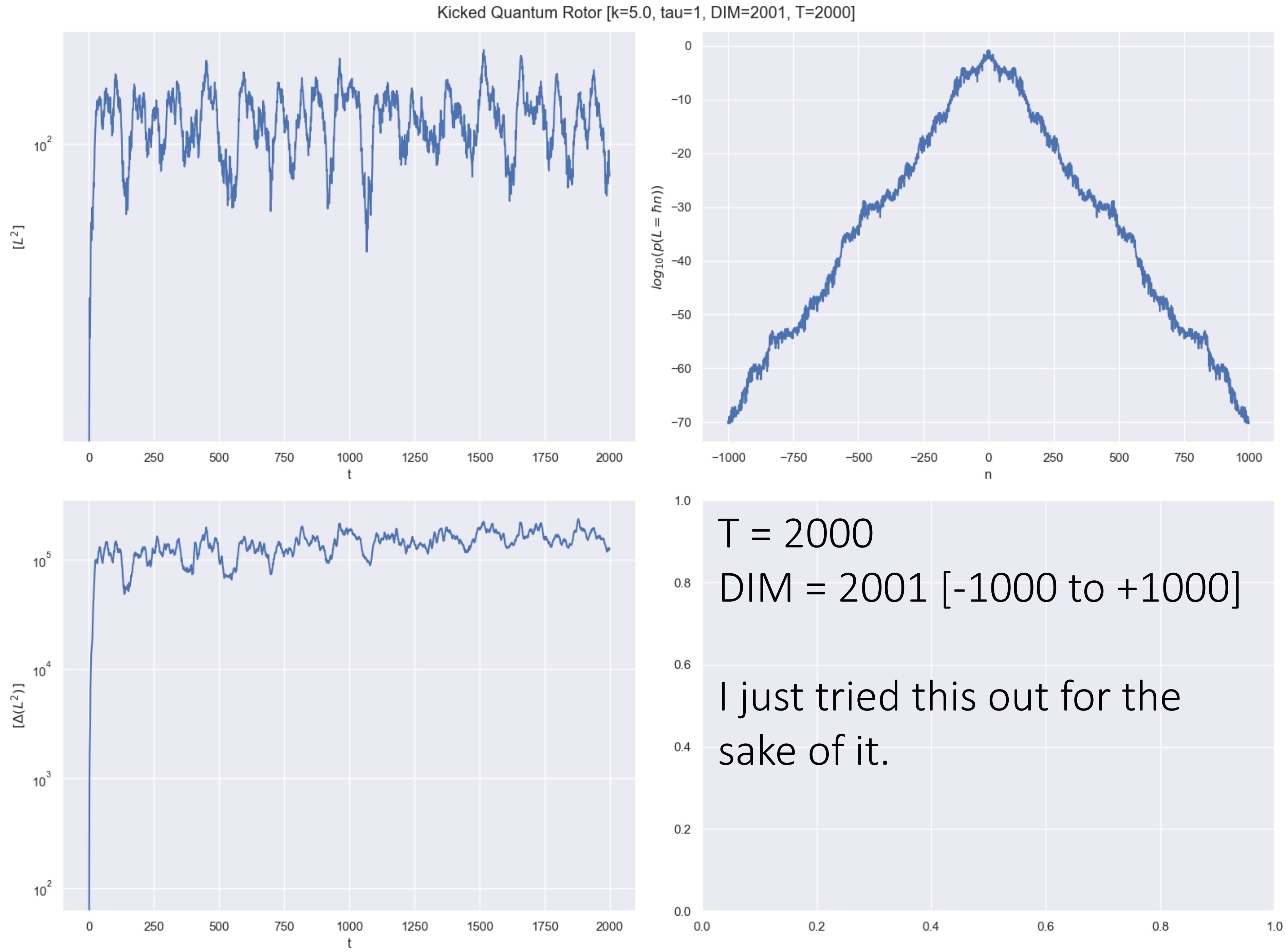
Kicked Quantum Rotor [k=5.0, tau=1, DIM=2001, T=1000]



T = 1000

DIM = 2001 [-1000 to +1000]

P(L = 1000 $\hbar$) seems to be stuck near ~10^{-70}. Is this a sign that we need higher DIM?


Kicked Quantum Rotor [k=5.0, tau=1, DIM=2001, T=2000]
[L^2]
t
log10(p(L = ħn))
n
[Δ(L^2)]
t
T = 2000
DIM = 2001 [-1000 to +1000]
I just tried this out for the sake of it.

Naïve Energy Balance

$$Tk = \frac{1}{2}\hbar^2 L_{max}^2 \tag{9}$$

$$T \leq \frac{\hbar^2 L_{max}^2}{2k} \tag{10}$$

$$[\text{If we take } \hbar = 1, L_{max} = 1000, k = 5]$$

$$T \leq 10^5 \tag{11}$$

which undoubtedly seems like an overestimate.