Homework #6

For the kicked rotator, we study the probability distribution of energies after a long time with many initial conditions. Since, we have already established that chaotic solutions are unbounded in energy, integrable initial conditions can be excluded by checking whether the energy stays small. Use $K \geq 4$.

- Plot the probability distribution P of energies in linear-log and log-log scales
- Determine whether P has a power law tail or an exponential tail at high energies
- If it is a power law tail, what is the exponent α, $P(E) \propto E^{-\alpha}$ for large E. If it is an exponential tail, what is the characteristic energy scale E_s, $P(E) \propto e^{-E/E_s}$ for large E.
- Perform robustness tests by using half the iteration time or half the number of initial conditions and by changing the range of energies you fit.

Comment: Energy accumulation via sudden periodic kicks has been considered as an explanation for cosmic rays and their energy distribution ("Fermi acceleration").