

The Boltzmann distribution and the quantum-classical correspondence

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Consider a one-dimensional quantum particle in a box, in thermal equilibrium with a large environment. Even for moderate temperatures, one finds that the probability distribution of the particle's position is remarkably uniform over most of the length of the box. This distribution function is a weighted average of the squares of the energy eigenfunctions, the weights being given by the Boltzmann distribution. In this talk, we begin by asking whether one can *deduce* the Boltzmann weights for this system – this would include deducing the energy eigenvalues – by insisting that the position distribution function be very flat. Numerical and analytic evidence suggests that the answer is yes. We then ask to what extent this observation might generalize to other physical systems.