$\dot{\hat{\rho}} = \frac{i}{\hbar}[\hat{\rho}, \hat{H}]$ eq of motion

analog in Q.M of Liouville eq.

$\rho(p,q)$ in classical stat

$\longrightarrow \rho_{nn'}$ in Q.M. energy rep

density matrix is not diagonal

as fix one makes it diagonal

$\bar{\rho}_{nn'} = w_n \delta_{nn'}$ (analog of w in classical stat)

off diagonal elements $e^{-\frac{i}{\hbar}(E_n - E_{n'})t} = 0$

good approx to ignore $\rho_{nn'}$ $n \neq n'$

$$\bar{f} = \sum_n w_n f_{nn}$$ quantum analog

$$\sum_n w_n(E_n) = 1$$

what are these E_n: representive

Enegy levels for a Hamiltonian with coord. confined to the subsystem

$$w^{total} = \prod w^{(a)}$$

$$E^{total} = \sum_{(a)} w^{(a)}$$

$$\ln w_n^{(a)} = -\alpha^{(a)} - \beta E_n^{(a)}$$

$$\boxed{w_n^{(a)} = e^{-\alpha^{(a)} - \beta E_n^{(a)}}}$$

Quantum Gibbs Dist.

$$\boxed{\bar{f}^{(a)} = \sum_n w_n^{(a)} f_{nn}}$$

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