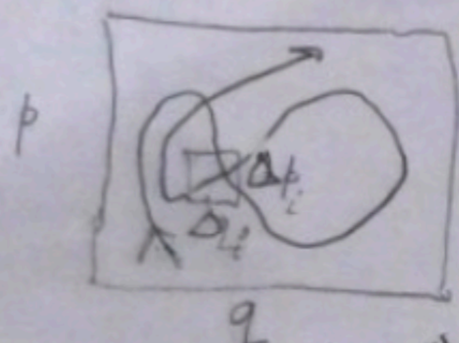
Calc. dist. fn ("measuring" dist. f'n)

p, q "phase space"



spend a time Δt out of a time t inside $\Delta p \Delta q$

$$\Delta w = \lim_{t\to\infty} \frac{\Delta t}{t} \longrightarrow dw$$

$$\rho(p,q) = \lim_{t\to\infty} \frac{\Delta w}{\Delta p \Delta q}$$

ave. of some $f(p,q)$

$$\bar f = \lim_{t\to\infty} \frac{1}{t}\int_0^t f(p(t),q(t))\,dt$$

recepie for averages by integrating over time

time av. approach

This is not done in Stat. Mech.!

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ensemble averages:

average over multiple system

two approaches ... identical sys.

(5)

average over systems

$$\bar F = \int \rho(p,q)\, f(p,q)\,dp\,dq$$

approach used in stat. mec.

in Mol. d%

$$\overline{(\Delta f)^2} = \int dp\,dq\,\left(f(p,q)-\bar f\right)^2 \rho(p,q)$$

$$= \int dp\,dq\,\rho(p,q)\, f^2(p,q) - \bar f^2$$

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deducing $\rho(p,q)$

int. eq. of motion

$p(t), q(t)$ in terms of initial constants, p_0, q_0

most are irrelevant

but some are important

"T" N ... E

from microscopics know <u>Additive</u> constants of motion

$N, E, \vec P, \vec M$ 7 additive cons. of motion

(1) (2) (3) at rest E N