1 question

Hello Maurizio,

we have been revising on the equipartition function and we couldnt get what the final passage was from getting

$$H = \sum cX^2 toCv = D/2KT$$

we think its important since there was a question in the last problem sheet explaining why the equipartition theorem doesnt work on a relativistic system and then asked what that formula would be like in a non quadratic Hamiltonian.

any help?

thanks alot!

2 reply

Hi

let me assume that you understood the final result of the generalized equipartition theorem.

Consider now a choice of H such that

$$H = \sum_i cx_i^n$$

with n some general number.

If you compute

$$x_j d/dx_j H$$

you get

$$n \sum_i c\delta_{ij} x_i^n$$

Now, if you sum over j you find that

$$\sum_j x_j d/dx_j H = n \sum_i cx_i^n$$

but then you recognize (! main point here !) that the right-hand side is just n H

Hence

$$< H >= 1/n < \sum_j x_j d/dx_j H >$$

and you just apply the generalized equipartition to the right hand side, which yields

$$1/n * DkT$$

with D the number of variables

$$x_i$$

.

For n=2 it is the usual story, for other choices of n, you get a different coefficient...

Makes sense?

Maurizio