1) the transfer function of an interacting cantilever is:

$$\left|\frac{kA}{F_0}\right|_{\omega=\omega_0} = \frac{1}{\sqrt{\left(-\frac{2V_{ts}}{kA^2}\right)^2 + \left(\frac{1}{Q} + \frac{E_{ts}}{\pi kA^2}\right)^2}}$$

Raman week 2
lectures 3-4

1*

- the equipartition theorem says $\frac{1}{2}k_BT$ of energy is associated with the motion of a system, i.e. per degree of freedom.
- From simple harmonic motion the energy of an oscillator is:

$\frac{1}{2}kA_0^2$ 2*

- We define A_0 as the amplitude of the "free" oscillator with "no" interaction, but with drive.

- If there is no external drive, the oscillator will have amplitude A_T (T: thermal) due to the thermal energy:

$$\frac{1}{2} k A_T^2 = \frac{1}{2} k_B T \quad //3$$

- When there is an interaction from the tip-sample, there is an effective spring constant k^*

recall:

effective resonance: $\omega_r = \omega_0 \left[1 - \frac{V_{ts}}{kA^2}\right]$

where ω_r is the effective resonance frequency, ω_0 is "free".

- then:

$$\omega r = \omega_0 \left[1 - \frac{V_{ES}}{KA^2} \right] \quad 4//$$

we see that ωr is affected by the Virial V_{ES} and the natural spring k.

QUESTIONS

1)- Find the equivalent expression of 3// when there is interaction or Virial.

2)- Write the error in amplitude, or thermal amplitude, when there is virial.

Explain and interpret results!