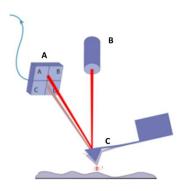
Bio-AFM 2022-2023 Problem Set

Lab (6 points)

a) In the laboratory session we have discussed the typical main components of an atomic force microscope. In the following scheme identify the components A, B and C. What is the other component we also discussed and is missing in the picture?



b) The table below presents three technical parameters of the cantilevers that we need to consider when we are going to image a sample. In a standard AFM, please indicate the one you would choose to image a cell in liquid medium and the one you would use to image a biomolecule like DNA. Justify your answer.

	Cantilever technical data				
	Resonance Frequency Nominal value - Force Tip radius (n		Tip radius (nm)		
	(KHz)	constant (N/m)			
Cantilever 1	50	0.1	~30 nm		
Cantilever 2	320	40	8		
Cantilever 3	50	0.1	< 8nm		

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Theory (14 points)
We have discussed contact and intermittent contact imaging achieved in a dynamic mode of operating the AFM cantilever. Describe in detail (1-2 pages) how both imaging techniques work, comparing e.g., the feedback signal used in the AFM electronics. Detail which physical quantity is maintained constant
during image scanning. Elucidate your explanation with figures/plots of physical parameters of the cantilever. Describe critical parameters of the cantilever during imaging. Are there any advantages/disadvantages of one imaging mode over the other? To complete your exposition, consult
reference on the internet (e.g., scientific literature, etc.). Consulted references need to be duly referenced.

