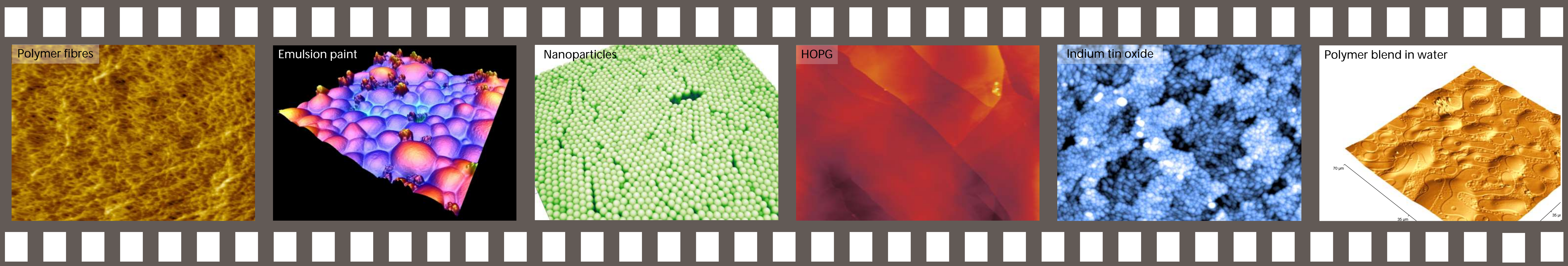


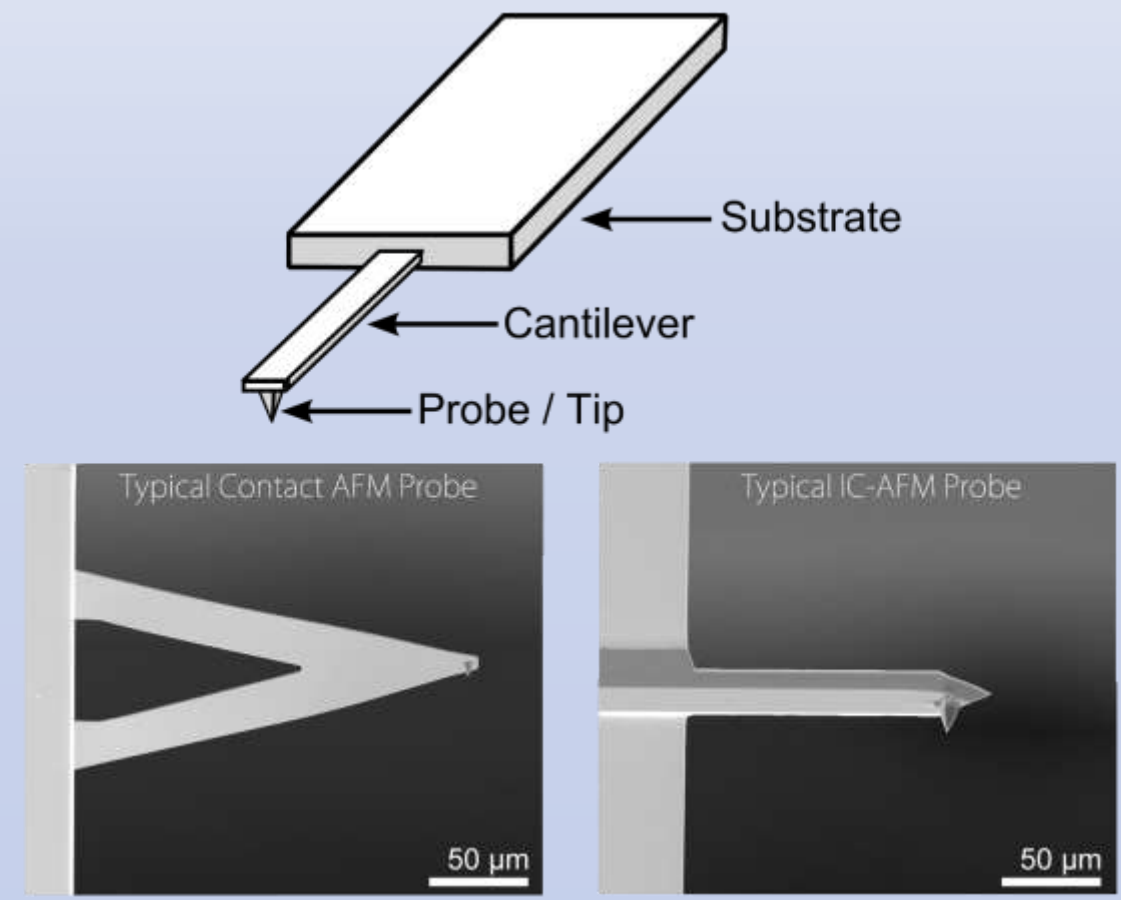
How Does Atomic Force Microscopy Work?

Peter Eaton, Requimte / Faculty of Sciences, University of Porto



Sharp Probe

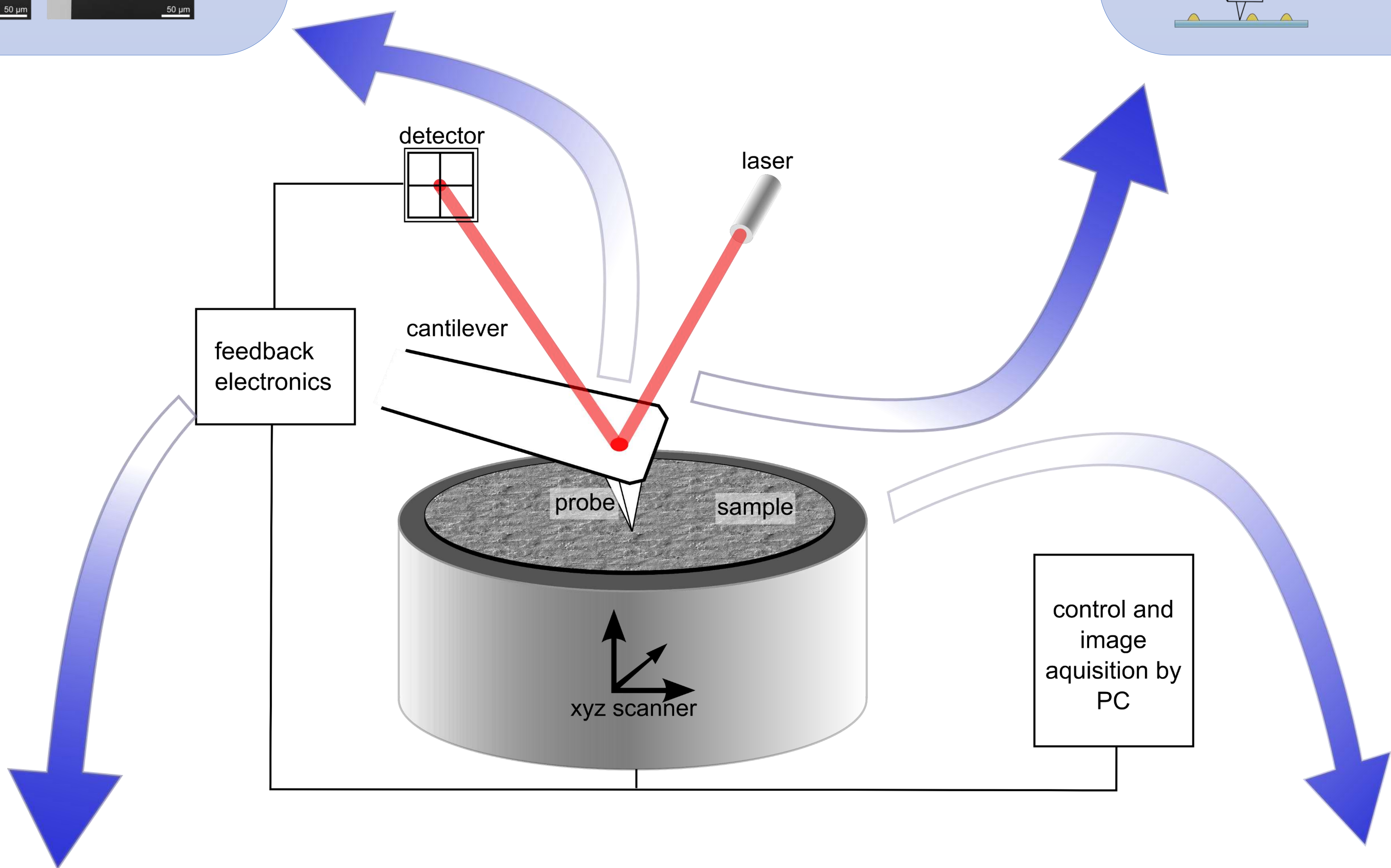
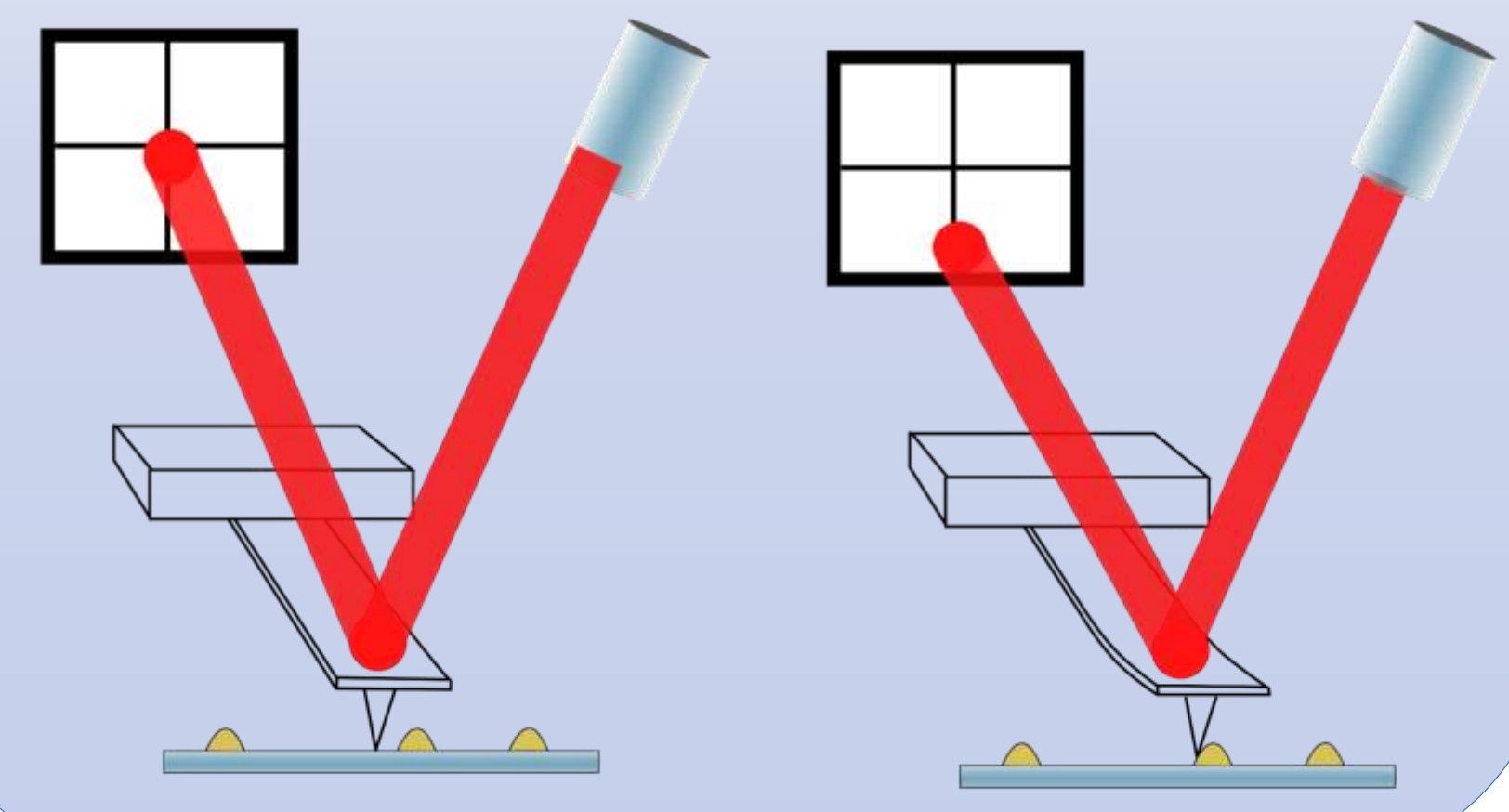
Probes can have end radii as low as 5 nm. The probe is attached to a cantilever and handled *via* the chip. The sharpness of the probe governs the lateral resolution of the system.



- The AFM is conceptually quite simple
- It works by scanning a sharp tip over the sample
- Four main elements enable it to generate images with high resolution

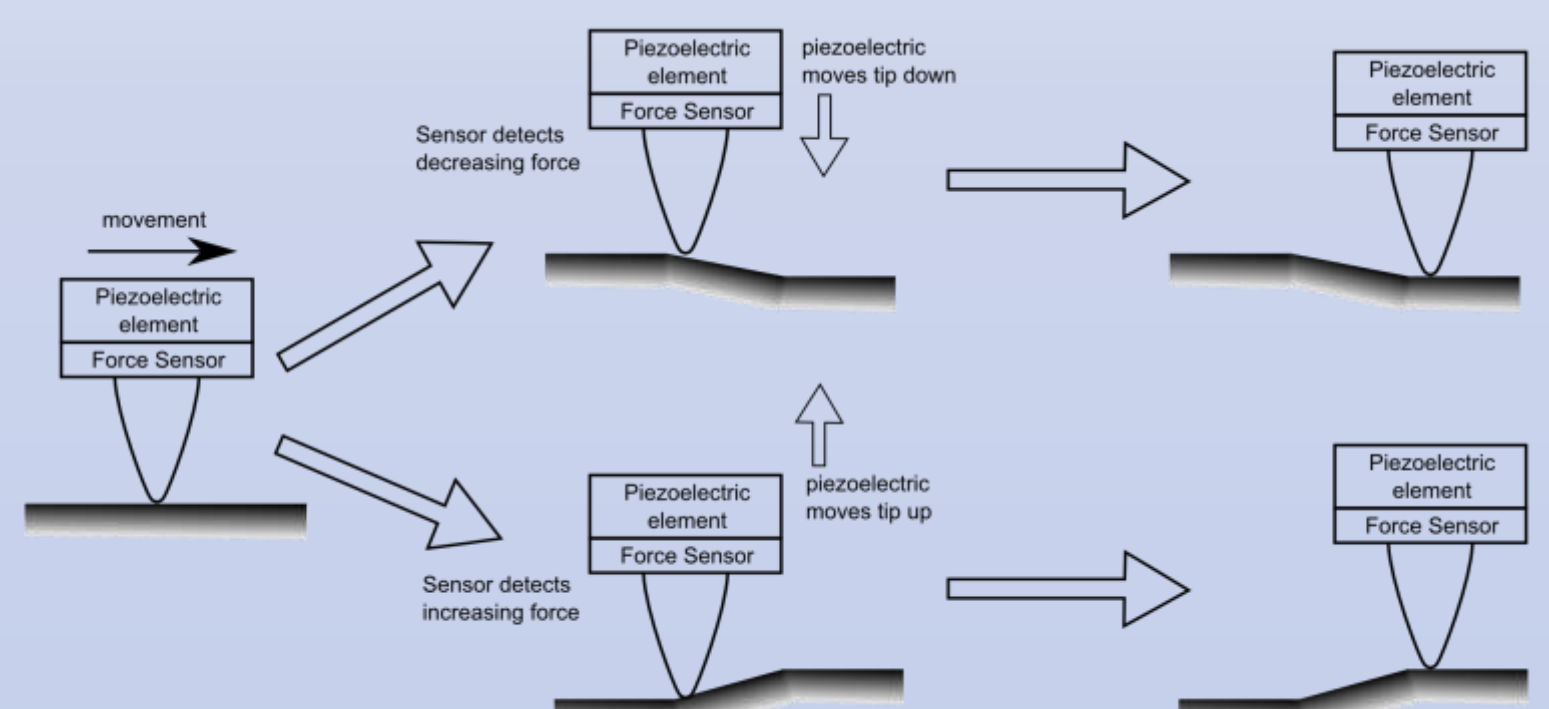
Optical Lever

The optical lever system detects small changes in bending of the probe, or its oscillation amplitude with very high precision. Tiny features < 1 Å in height can be measured.



Feedback Mechanism

The feedback electronics use the signal from the photodetector to control the z piezo, such that overall the force between the probe and the sample remain constant.



The sharp probe, feedback mechanism, high-precision piezoelectric scanner, and optical lever allow the AFM to generate amazing images such as shown on this poster.

Piezoelectric Scanner

The scanner is used to move the probe over the sample in three dimensions. Various designs exist, the example here is a tripod scanner with separate x, y and z piezoelectric actuators. The scanner is capable of nanometre accuracy movements.

