IX. FIGURES

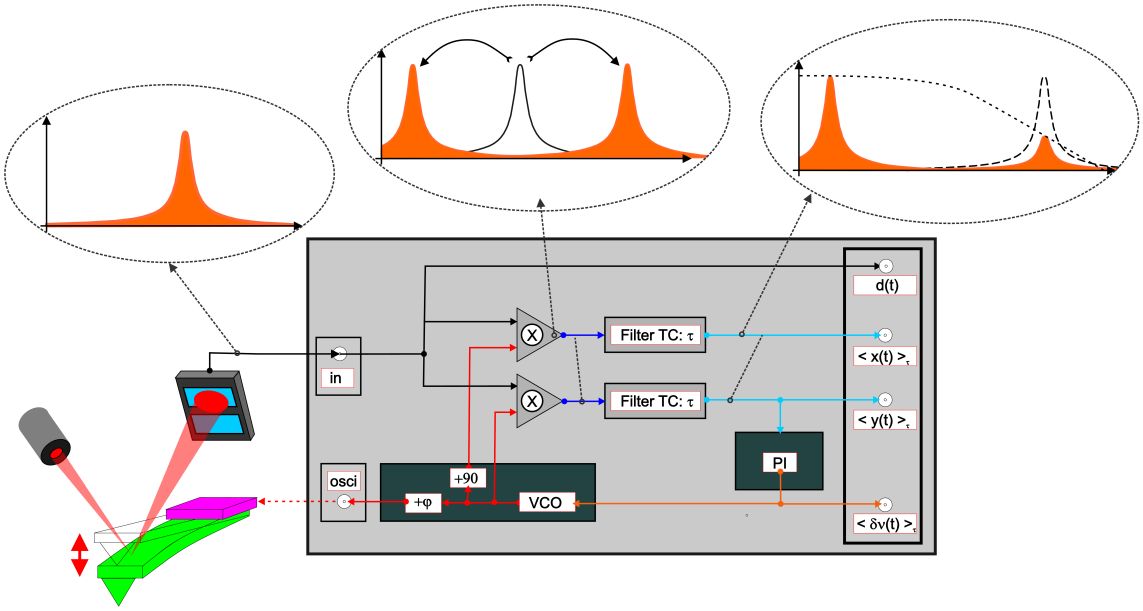

Figure 1: Schematic description of a typical lock-in type DSFM detection unit. The signal to be analyzed by the DSFM detection is assumed to be centered around some frequency ν_0. It enters the detection unit at the input "*in*", is amplified and usually high-pass filtered (for simplicity the corresponding components are not shown) before being multiplied with two reference signals in quadrature at a frequency ν_{ref}, shifting the signal to the frequencies $\nu_0 - \nu_{ref}$ and $\nu_0 + \nu_{ref}$. The resulting signals are then low-pass filtered to remove the higher frequency component $(\nu_0 + \nu_{ref})$, resulting in two averaged signals $\langle x(t)\rangle_\tau$ and $\langle y(t)\rangle_\tau$. For sufficiently small interaction $\langle x(t)\rangle_\tau$ is proportional to the frequency shift and can be used to re-adjust the driving frequency of the VCO (or NCO) by means of an appropriate feedback loop (PI-controller). The output of the PI-controller used to adjust the excitation frequency is then proportional to the frequency shift $\delta\nu(t)$.