

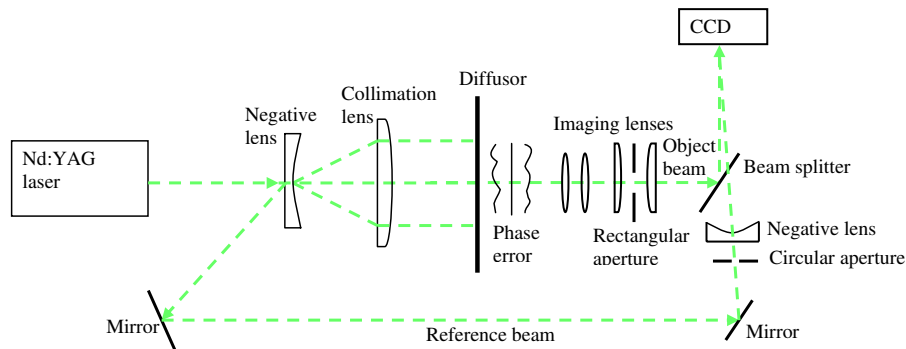
# Digital Holographic Interferometry in a disturbed environment

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Many things may happen when moving a delicate experimental technique such as Digital Holographic Interferometry into a real world application. There may be vibrations, air turbulence or even dust and scattering particles present partly destroying or perturbing the experiment. Such disturbances significantly reduce the reliability of the technique and prevent spread into a wider area of application. This presentation presents results from an investigation on disturbances on Holographic images caused by air turbulence and vibrations.

To handle the problem with air turbulence a temporal sequence of an event is analysed and the effect on the motion and phase of the speckles is analysed and described using statistical measures (auto- and cross variance of the disturbance). The effect of the medium is fed back to the sequence and the undisturbed phase evolution is estimated. The principle is demonstrated using a heat source placed in between the object and the CCD camera as the disturbance on a simple tilt and vibration experiment. The experimental set-up is shown in the figure 31.



Figur 31: Principle of the experimental set-up. A laser illuminates a diffuse object and a hologram is acquired on the CCD using an off-axis reference beam. If a phase disturbance is present between the object and the CCD imaging and phase errors are introduced in the measurement.