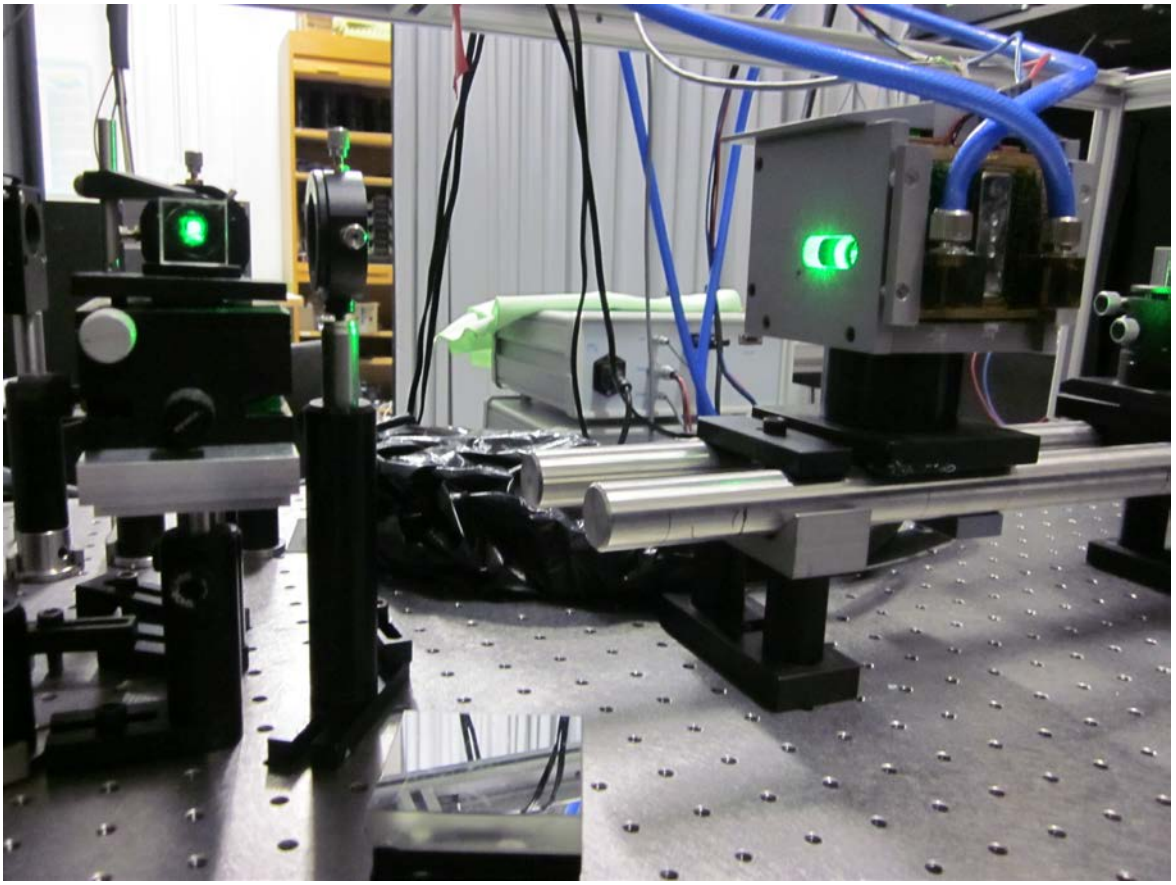
Diffusing Wave Spectroscopy (DWS)



We have installed two DWS-setups at the University of Fribourg to extend our light scattering capabilities to the regime of highly turbid systems. A home-built setup is shown in the figure above. The sample cell is mounted into an index matching water bath which can also serve as a temperature control reservoir. A polarizer/lambda half wave plate setup allows a continuous variation of the incident light intensity coming from a solid state laser (Cobolt at 532 nm, 150 mW). The scattered light can be detected either in transmission (no polarization dependence) or reflection. In reflection geometry a polarizer allows the detection of VV and VH scattered light. The setup is designed in order to fulfill all requirements for a correct DWS measurement:

DWS setup: A intense laser beam is scattered from a turbid sample contained in a temperature controlled water bath. The scattered light is detected in transmission or backscattering with a mono mode fiber or a CCD camera and subsequently analyzed digitally (correlator and PC)

- Spatially extended incident beam, width of the incident gaussian beam w=ca.7mm - in most cases the beam width w is also significantly larger than the sample cell thickness L - this feature can be important for transmission measurements.

- Index matching bath for the suppression of total reflection at the glass air interface of the sample cell.

- Holds in a reproducible way standard Hellma sample cells and home-built cells of the minimum size 10mmx1 up to 20x5mm (w x L)

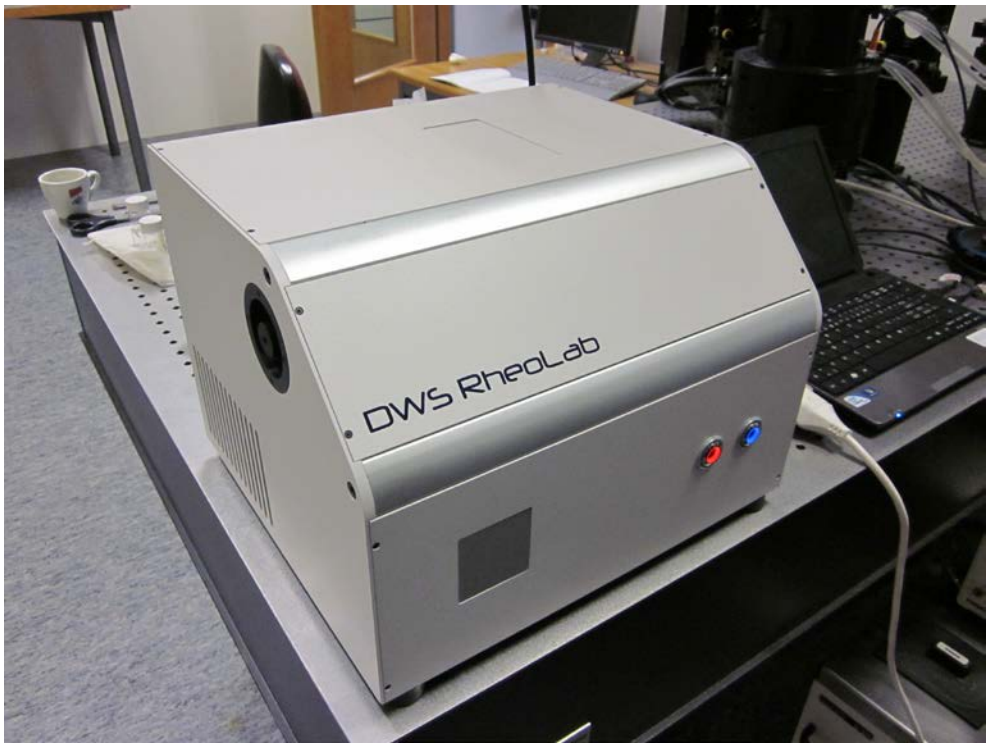
- Adjustable polarizer (not displayed) in front of the "Detektor-Faser Rückstreuung" allows VV and VH-detection of the backscattered light.

- continuous control of the incident light intensity

- temperature control (+/-0.1°C)

The second setup (Rheolab, LS Instruments) allows for DWS Microrheology in a fully automated way. Some of its important features are:

- Compact and robust desing
- Integrated temperature control (16°C-70°C)
- Analysis software for easy extraction of Storage Modulus G'(ω), Loss Modulus G''(ω) and Mean Square Displacement (MSD) of particles.



For more information visit http://www.lsinstruments.ch/products/dws_rheolab_ii/

Further Reading:

1) G. Maret and P.E. Wolf, Z. Phys. B, 65, 409 (1987), D.J. Pine, D.A. Weitz, P.M. Chaikin und E. Herbolzheimer, Phys. Rev. Lett, 60, 1134 (1988)

2) D.A. Weitz und D.J. Pine in Dynamic Light Scattering, Edited by Brown W, New York; Oxford U. Press (1993), Kap.16, 652-720

3) G. Maret, Current Opinion in Coll. Interf . Sci. 2, 251-257, (1997)