Static and Dynamic light scattering

Setup

We have two light scattering set-ups, a commercial one by ALV-Laservertriebsgesellschaft (Langen, Germany) with a Helium-Neon laser (632.8 nm) and a home built with a Krypton ion laser (647.1 nm) at a power output up-to 300 mW. The thermostatted sample cell is placed on a motor-driven precision goniometer (±0,01°) which enables the photomultiplier detector to be moved accurately from 20° to 150° scattering angle.

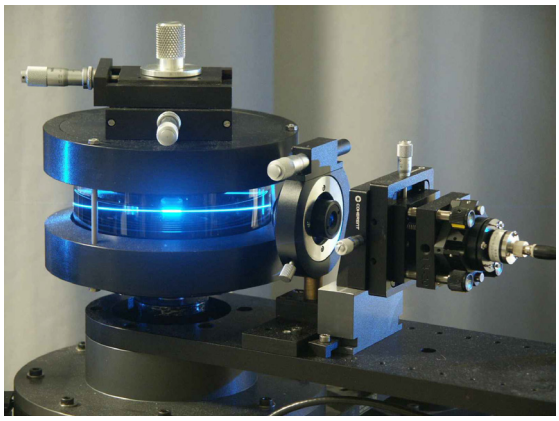

Figure 1: Index bath with sample cell. At the right hand side is the detector arm with the analyzer and the holder for the mono mode fiber.

While in static light scattering the average scattering intensity is measured, in the dynamic light scattering experiment the temporal fluctuations of the intensity fluctuations are recorded. The scattered light fluctuates due to the Brownian motion of the particles. This motion gives rise to a Doppler effect and so the scattered light possesses a range of frequencies shifted very slightly from the frequency of the incident light (this phenomenon is called *quasi-elastic scattering*). These frequency shifts yield information relating to the movement or dynamics of the solute molecules or colloids. The motion of solute molecules is recorded in terms of the intensity time-correlation function with an ALV-5000 multi tau digital correlator with 256 channels.

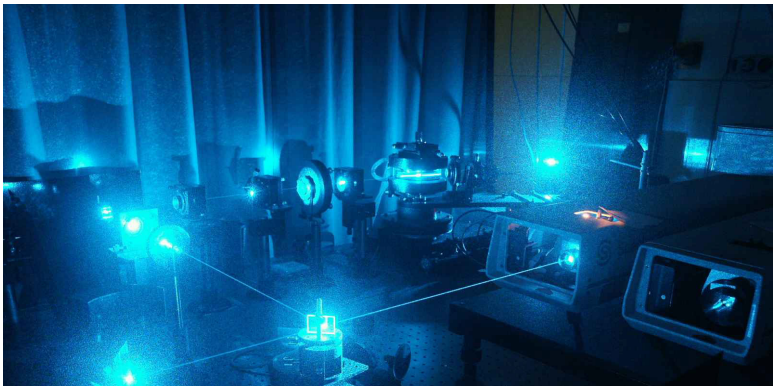

Figure 2: Light scattering set-up.