

## KEMS431 – Fluorescence lifetime

The aim of this lab is to measure the fluorescence lifetime of a dye by using a single-photon-counting setup and to determine the rotational correlation time for the molecule in solution by measuring the anisotropy decay of the fluorescence. Rotational correlation time can be used e.g. to estimate the size of the molecule. The experiments will be conducted at room temperature and also for the cooled down sample in order to inspect the effect of temperature to fluorescence lifetime and the rotational motion of a molecule.

Description of the measurements:

- The sample will be prepared by dissolving eosin dye to ethanol (NB: Ethanol must be spectroscopic grade)
- Absorption and emission spectra of the sample will be measured. For the single-photon-counting experiments the concentration of the sample will be tuned such that the absorbance is around 0.1 at wavelength 485 nm.
- We will familiarize ourselves with the single-photon-counting setup and its components.
- The time resolution of the setup will be defined by measuring the scattering signal of the excitation pulse.
- The lifetime of the eosin fluorescence will be measured at room temperature. To define anisotropy decay fluorescence signal with parallel and perpendicular polarizations in respect of polarization light will be collected, respectively.
- The sample will be cooled down by using a liquid nitrogen cryostat.
- The measurements will be repeated from the cold sample.