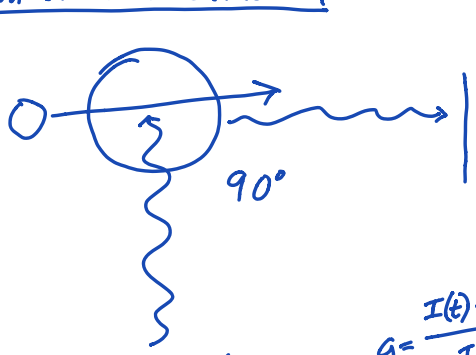
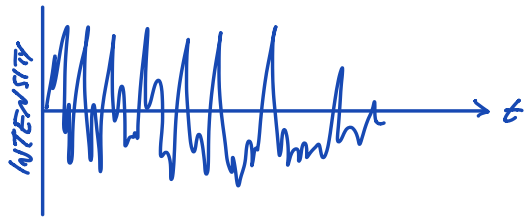
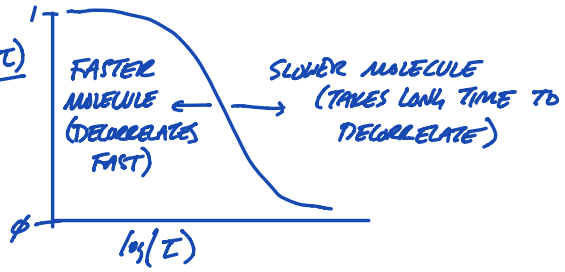
MEASURING DIFFUSION, 11/26/2019

DYNAMIC LIGHT SCATTERING





$$g = \frac{I(t)\cdot I(t+\tau)}{I(t)^2}$$



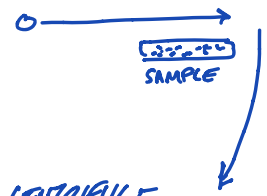
$$g(\tau) \sim \exp\left(-q^2 \cdot D \cdot \tau\right)$$

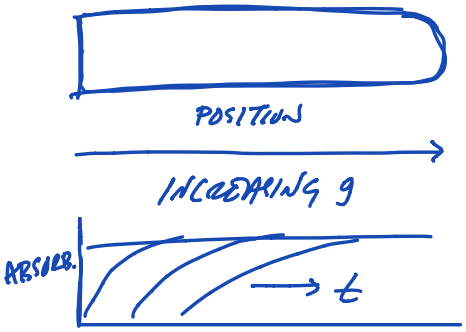
GEOMETRY · DIFFUSION

$$q = \frac{4\pi n_0}{\lambda}\cdot \sin\left(\frac{\theta}{2}\right)$$

n_0 : REFRACTIVE INDEX
λ : LASER WAVELENGTH
θ : DETECTOR ANGLE.

SEDIMENTATION VELOCITY (ANALYTICAL ULTRACENTRIFUGATION):





TERMINAL VELOCITY

↓ mg h
↑ AIR RESISTANCE

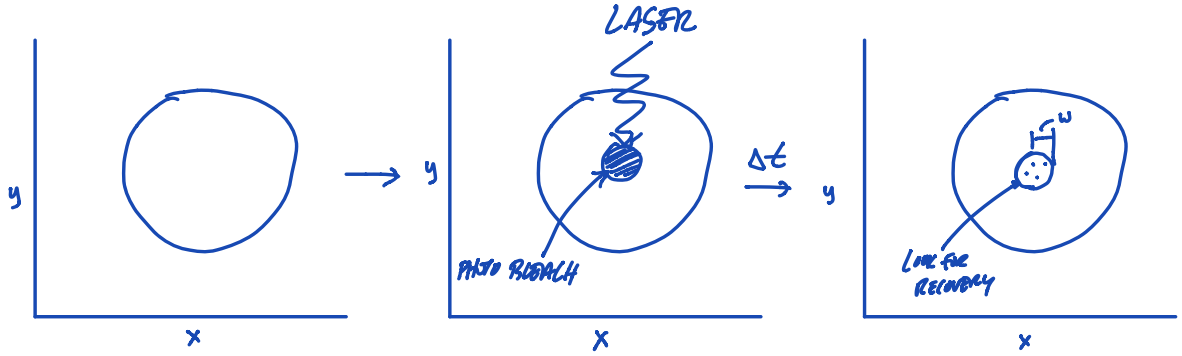
↓ CENTRIFUGE
↑ VISCOCITY

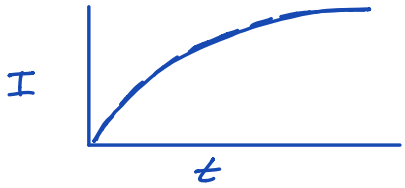
VELOCITY → $\frac{V_t}{a} = S = \frac{m}{6\pi\rho r}$ ← ACCELERATION APPLIED

YOU USUALLY KNOW MASS, SO YOU CAN SOLVE FOR r.

$$D = \frac{k_B T}{6\pi\rho r}$$

FLUORESCENCE RECOVERY AFTER PHOTOBLEACHING (FRAP)

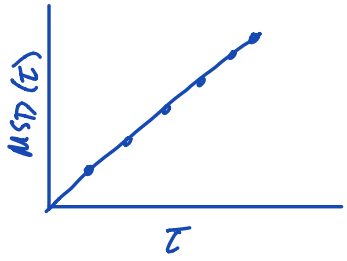




$$f(t) \sim 1 - e^{-w^2/2 \cdot D} \text{ (STUFF)}$$

↑ LASER IS A GAUSSIAN...

SINGLE PARTICLE TRACKING:



$(x(t) - x(0))^2$ ← (STANDARD DEVIATION)

$MSD(t) = 2 \cdot n \cdot D \cdot t$