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Exploring asymmetry in the optical dispersion of dyes in solution near an absorption resonance AMELIA VANENGEN SPIVEY, Physics Department, University of Puget Sound, Tacoma, Washington — Dispersion is the dependence of the refractive index of a material on wavelength. Dispersion is problematic in ultrafast optics experiments, which use broad-spectrum laser pulses lasting hundreds of femtoseconds or less. Together with nonlinear effects, dispersion can cause undesirable changes (such as temporal spreading or pulse splitting) to a propagating ultrafast laser pulse. Temporal spreading of ultrafast laser pulses during propagation is primarily governed by the group velocity dispersion (GVD) coefficient. Therefore, modeling ultrafast pulse propagation in a material requires accurate knowledge of the GVD coefficient in the material. This talk presents experimental measurements of the GVD coefficient of dyes in solution using a white light Michelson interferometer. In particular, we probe the dependence of the GVD on wavelength near the absorption resonance in the dye. We find the wavelength dependence of the GVD to be asymmetric about the absorption resonance. On the low-wavelength side of the resonance, the dye contribution to the GVD is negligibly small. However, on the high-wavelength side, the dye contribution to the GVD can be significant and is highly wavelength dependent. This effect is consistent with a simple Lorentz model of dispersion and can be modeled accurately using the linear absorption spectrum of the dye.

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