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Novel Method for Selective Probing of Ground-State Rotational Dynamics of Solutes in Solvents THAI V. TRUONG, Y.R. SHEN, Department of Physics, University of California, Berkeley — We present an optical pump/probe method that allows selective measurement of ground-state rotational dynamics of solutes in liquids. It is known that because of different solute-solvent interactions, a solute in different electronic states could have markedly different rotational dynamics in the same solvent. However, this state-specific rotational dynamics has not yet been fully explored. It is particularly difficult to measure that of the ground state since the probe often cannot distinguish responses from various molecular species (ground-state solute, excited-state solute, and solvent) present in the solution. We employ two successive pump pulses that are adjusted to create an optical linear dichroism arising from the orientational distribution of only the ground-state solute molecules, hence allowing direct measurement of the ground-state rotational dynamics of the solute. Application of the technique to a dye-solvent system shows a large difference between rotational diffusion rates of the ground state and the excited state of the dye molecules. This work was supported by National Science Foundation.

Thai V. Truong
Department of Physics, University of California, Berkeley

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