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**Following population transfer in a pump-dump experiment using time-resolved x-ray scattering**[1] MATTHEW WARE, Department of Physics at Stanford University, PULSE Institute, JAMES GLOWNIA, LINAC Coherent Light Source, SLAC National Laboratory, NOOR AL-SAYYAD, Department of Physics at Stanford University, PULSE Institute, PHILIP BUCKSBAUM, Department of Physics, Applied Physics, and Photon Science at Stanford University, PULSE Institute — Molecular iodine was photoexcited using a combination of 520 and 800 nm light at variable delay. The 520 nm pump pulse photoexcites iodine onto the bound B state, and the 800 nm dump pulse can couple the excited population back to the X state when the resonance condition is satisfied. The dump population was observed at the LINAC Coherent Light Source (LCLS) using time-resolved x-ray scattering (TRXS) or, rather, the temporal Fourier transform of TRXS, called frequency-resolved x-ray scattering (FRXS). The FRXS identifies a dump population with a beat frequency of $31.8 \pm 0.9$ THz oscillating about an equilibrium position of $3.2 \pm 0.1$ Å, which match the expected values. The dump population varies with a period of $330 \pm 20$ fs, half of the B state vibrational period.

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Matthew Ware
Stanford University

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