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**Coherent Pumping of Vibrational States within Proteins** ROBERT AUSTIN, Princeton University, AIHUA XIE, Oklahoma State University, LEX VAN DER MEER, BRITTA REDLICH, FOM Institute for Plasma Physics, MARLAN SCULLY, Texas A&M University, PER-ANKER LINGARD, QUP Centre, Danish Technical University, HANS FRAUENFELDER, Los Alamos National Lab — We show that there exist narrow spectral states within the amide I band of proteins which have dephasing times on the order of 10 picoseconds. We also show that these states can be pumped coherently by the Rabi mechanism if the pump pulse has a linewidth less than the anharmonic shift between the first and second excited states of the carbonyl anharmonic oscillator. The spectral region of these narrow states lies on the short wavelength region of the amide I band, suggesting that these long coherence states originate from buried amino acids which are not in contact with the hydration shell of the protein.

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