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Hidden Linear Quantum States in Proteins: Did Davydov Get the Sign Wrong? ROBERT AUSTIN, Princeton University, AIHUA XIE, Oklahoma State University, BRITTA REDLICH, LEX VAN DER MEER, Radboud University Nijmegen — A fair amount of time has been spent hunting down one prospective quantum mechanical model, namely the Davydov solition along the α-helix backbone of the protein. These experiments were challenging, we used a tunable ps mid-IR Free Electron Laser to try and observe the long-term (microsecond or greater) trapping of coherent excitation in proteins which had been proposed by a several theorists. These experiments were successful in the sense that we directly observed vibrational excited state population relaxation on the picsecond time scale, and transfer of coherent excitation into the incoherent themal bath: but we we did not see the trapping on the microsecond time scale of short (ps) coherent light pulses in the amide I band of a generic alpha-helix rich protein, myoglobin. However, we would like to revisit that experiment one more time in this paper to analyze and try to understand something puzzling that we did observe, in the context a possible unusual "hidden" quantum phenomena in proteins which probably is of no biological consequences, but bears re-examination.

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