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Production of Ultracold Molecules with Chirped Nanosecond-Time-scale Pulses JENNIFER CARINI, Department of Physics, University of Connecticut, Storrs, CT 06269, USA, SHIMSHON KALLUSH, Department of Physics, ORT-Braude College, P.O. Box 78, 21982 Karmiel, Israel, RONNIE KOSLOFF, Department of Physical Chemistry and the Fritz Haber Research Center for Molecular Dynamics, Hebrew University of Jerusalem, Jerusalem 91904, Israel, PHILLIP GOULD, Department of Physics, University of Connecticut, Storrs, CT 06269, USA — We describe quantum simulations of ultracold $^{87}Rb_2$ molecule formation using photoassociation with nanosecond-time-scale pulses of frequency chirped light. In particular, we compare the case of a linear chirp to one where the frequency evolution is optimized by local control of the phase, and find that local control can provide a significant enhancement. The resulting optimal frequency evolution corresponds to a rapid jump from the photoassociation absorption resonance to a downward transition to the target state, a bound level of the lowest triplet state. We also consider the case of two frequencies and investigate interference effects. The assumed chirp parameters should be achievable with nanosecond pulse shaping techniques and are predicted to provide a significant enhancement over recent experiments [PRA 87, 011401(R) (2013)] with linear chirps. This work is supported by DOE and BSF.

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