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All-Optical Scheme to Produce Quantum Degenerate Dipolar Molecules in the Vibronic Ground State[1] MATT MACKIE, CATHERINE DEBROSSE, Temple University — We consider two-color heteronuclear photoassociation of Bose-condensed atoms into dipolar molecules in the $J = 1$ vibronic ground state, where a free-ground laser couples atoms directly to the ground state and a free-bound laser couples the atoms to an electronically-excited state. The addition of the excited state creates a second pathway for creating ground state molecules, leading to quantum interference between direct photoassociation and photoassociation via the excited molecular state, as well as a dispersive-like shift of the free-ground resonance position. Using LiNa as an example, these results are shown to depend on the detuning and intensity of the free-bound laser, as well as the semi-classical size of both molecular states. Despite strong enhancement, coherent conversion to the LiNa vibronic ground state is possible only in a limited regime near the free-bound resonance.

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