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**Continuous all-optical deceleration of molecular beams and demonstration with Rb atoms** XUEPING LONG, Univ of California - Los Angeles, ANDREW JAYICH, Univ of California - Santa Barbara, WESLEY CAMPBELL, Univ of California - Los Angeles — Ultracold samples of molecules are desirable for a variety of applications, such as many-body physics, precision measurement and quantum information science. However, the pursuit of ultracold molecules has achieved limited success: spontaneous emission into many different dark states makes it hard to optically decelerate molecules to trappable speed. We propose to address this problem with a general optical deceleration technique that exploits a pump-dump pulse pair from a mode-locked laser. A molecular beam is first excited by a counter-propagating “pump” pulse. The molecular beam is then driven back to the initial ground state by a co-propagating “dump” pulse via stimulated emission. The delay between the pump and dump pulse is set to be shorter than the excited state lifetimes in order to limit decays to dark states. We report progress benchmarking this stimulated force by accelerating a cold sample of neutral Rb atoms.

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