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Continuous-Wave Light Modulation at Molecular Frequencies JOSHUA WEBER, JONATHAN GREEN, DENIZ YAVUZ, University of Wisconsin at Madison — We use continuous-wave (CW) stimulated Raman scattering inside a hydrogen-filled, high-finesse cavity as a wavelength-independent molecular modular for optical light. CW laser beams whose frequency difference is slightly detuned from a molecular Raman resonance are used to drive rotational transitions in the hydrogen. The high intensity of these fields inside the cavity induces coherent rotations, and in this coherent state the molecules act as a CW modulator. Thus, any wavelength of optical light can be modulated by a single pass through the cavity. In our proof of principle experiment, we use Raman beams of wavelengths 1064 nm and 1135 nm that are resonant with the cavity to create a molecular coherence that modulates a 785 nm beam in a single pass. The modulation frequency is approximately 18 THz, which corresponds to a rotational transition in molecular hydrogen.

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