Abstract Submitted
for the DAMOP19 Meeting of
The American Physical Society

Progress towards sub-femtosecond pulse generation using molecular modulation DAVID GOLD, DENIZ YAVUZ, University of Wisconsin - Madison — We have constructed a broadband continuous-wave optical modulator at a frequency of 90 THz. Our modulator consists of a deuterium-gas filled cavity that is resonant at both the pump and Stokes wavelengths. With our setup, we can modulate almost any beam in the optical region of the spectrum with a single pass efficiency of $\approx 10^{-4}$. This is a comparable efficiency to the fastest electro-optic modulators, but with a modulation frequency 1000 times greater. We have used this system to modulate a Ti:sapph laser and produce up and down shifted sidebands. The Ti:sapph laser produces a pulse train with pulse widths of 50 fs and a repetition rate of 94 MHz. The Ti:sapph output is mode-matched to the cavity and is modulated in a single pass. The cavity output is separated from the intense pump and Stokes beams using a dichroic mirror and is sent into a custom-built grating spectrometer to demonstrate the presence of the anti-Stokes sideband with spectral features matching the initial Ti:sapph beam. Additionally, we show that the sideband is pulsed with a repetition rate of 94 MHz just like the initial beam. In the future, with dispersion compensation, applying this technique to a state of the art Ti:sapph could yield the shortest pulses ever produced in the optical region of the spectrum.

David Gold
University of Wisconsin - Madison

Date submitted: 04 Feb 2019 Electronic form version 1.4