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**Sub-Two Cycle Compression of Yb Laser Pulses using Rotational Nonlinearity Enhancement in Molecular Gases**[1] NRISIMHA MURTY MADUGULA, JOHN BEETAR, TRAN-CHAU TRUONG, Department of Physics, University of Central Florida, GARIMA C. NAGAR, Department of Physics, Applied Physics and Astronomy, Binghamton University, YI WU, Department of Physics, University of Central Florida, BONGGU SHIM, Department of Physics, Applied Physics and Astronomy, Binghamton University, MICHAEL CHINI, Department of Physics, University of Central Florida — Few-cycle pulse generation has largely been achieved through the nonlinear propagation of short (<10-cycle) pulses in noble gas-filled capillaries, where the "instantaneous" optical nonlinearity can be efficiently exploited to generate octave spanning bandwidths. At much longer input pulse durations (>100-cycle), generating comparable bandwidths using noble gases requires employing larger levels of nonlinearity, prolonged interaction lengths, or multiple compression stages. By instead using linear molecular gases, where the field-driven alignment of the molecular ensemble boosts the optical nonlinearity, multi-octave supercontinua supporting sub-cycle durations can be generated. We demonstrate the enhanced supercontinuum generation by propagating 280 fs pulses in $N_2$, $N_2O$, and $CO_2$ filled hollow-core fiber. We compress pulses below two-optical cycles and use them to generate high-order harmonics.

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