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Angular-momentum-assisted dissociation of CO in strong optical fields[1] AMY MULLIN, HANNAH OGDEN, MATTHEW MURRAY, QINGNAN LIU, CARLOS TORO, University of Maryland — Filaments are produced in CO gas by intense, chirped laser pulses. Visible emission from C_2 is observed as a result of chemical reactions of highly excited CO. At laser intensities greater than 10^{14} W cm^{-2}, the C_2 emission shows a strong dependence on laser polarization. Oppositely chirped pulses of light with ω_0 =800 nm are recombined spatially and temporally to generate angularly accelerating electric fields (up to 30 THz) that either have an instantaneous linear polarization or act as a dynamic polarization grating that oscillates among linear and circular polarizations. The angularly accelerating linear polarization corresponds to an optical centrifuge that concurrently drives molecules into high rotational states (with J≈50) and induces strong-field dissociation. Higher order excitation is observed for the time-varying laser polarization configuration that does not induce rotational excitation. The results indicate that the presence of rotational angular momentum lowers the threshold for CO dissociation in strong optical fields by coupling nuclear and electronic degrees of freedom.

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