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Measurements of ultrafast laser-driven ionization and extreme gas nonlinearity[1] SINA ZAHEDPOUR, YU-HSIANG CHENG, JARED WAHLSTRAND, HOWARD MILCHBERG, University of Maryland, College Park — A 2D spectral interferometry method for measuring high laser field phenomena such as laser-driven ionization and high field nonlinearity is introduced. The method is based on Single-shot Supercontinuum Spectral Interferometry, in which a chirped supercontinuum is used to probe the time-dependent refractive index induced by a pump pulse. A thin gas target ensures uniform intensity and minimizes refraction of the probe beam due to refractive index gradients. An imaging spectrometer allows measurement of the spatial dependence of the response along one direction. To measure in 2D, a motorized mirror scans the probe beam across the spectrometer slit. The technique has 3 micron spatial and 5 fs temporal resolution. The effective interaction length is measured interferometrically, allowing absolute calibration of the refractive index change. We present measurements of the absolute ionization rates of noble and molecular gases and their high field nonlinear response.

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