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Picosecond CARS System for Measurement of Electric Field and Vibrational Distribution Fuinction in Hihg Pressure Nanosecond Pulsed Plasmas AARON MONTELLO, IGOR ADAMOVICH, WALTER LEMPERT, Ohio State University, ED BARNAT, SEAN KEARNEY, Sandia National Laboratories — Recently, Ito, et al (J. Phys. D: Appl. Phys., 43, 2010) have demonstrated the ability to measure electric field in high pressure N_2 containing plasmas by Infrared Coherent Anti-Stokes Raman Spectroscopy (CARS), with temporal resolution of ∼10 nanoseconds. In this poster, progress towards a new IR CARS instrument for electric field measurements, with temporal resolution of ∼150 psec, will be described. The instrument utilizes a broadband, modeless, psec dye laser which outputs broad spectral band output centered at near 604nm, with a full-width half-max bandwidth of approximately 7 nm. The Nd:YAG pump laser generates ∼150 psec duration pulses using an internal Stimulated Brillouin Scattering pulse compression cell, and is capable of 2^{nd} harmonic (532 nm) output energy of up to 120 mJ/pulse. As a first example of the sensitivity of the system, Vibrational Distribution Functions (VDFs) of nitrogen in CO/N_2 CO laser optically pumped plasmas, at pressures as low as a few Torr, will be presented. An overview of planned electric field measurements in quasi-one dimensional nsec pulse discharges and in Fast Ionization Wave (FIW) discharges, in which the field profile is predicted to evolve in space and time on sub-nanosecond time scales, will also be presented.

Walter Lempert
Ohio State University

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