OPTICAL SCIENCE & ENGINEERING
University of New Mexico

"SPECIAL" OSE SEMINAR

Dr. Martin Richardson

CREOL, Univ. of Central Florida

Monday, November 30, 2015 at
CHTM, Rm. 101 from 10:00 AM – 11:00 AM

Abstract:

Femtosecond laser pulses of sufficient energy can self-focus in air creating "filaments" of light. Laser filamentationis generatedby the dynamic balance betweenKerr self-focusing and plasma defocusing of ultrashort laser pulse. One of the numerous applications of laser filaments that will be described here is in the context of Laser-induced water condensation (LIC), which has been considered in the recent years as a strong candidate for possible precipitation control [1]. Filamentation is a serious candidates for LIC because of its its characteristics of long distance propagation [2], robustness, and capability to travel through fogs and clouds [3], low pressures [4] and even through turbulences [5]. Up to now, few results have been published on the interaction of filaments with water particles and its impact on both the filament and water particles [1, 3, 6]. In the present study, the size distribution of water particles as theyinteract with a single filament is observed. In addition, a single droplet was interacted with a single filament to measure the energy dissipated during the interaction as well as the changes in particle sizes of a single water droplet after the interaction. Optical shadowgraph images were taken using femtosecond beam to capture and analyze shockwaves of the interaction. The measurement of the energy dissipated during filament-aerosol interaction, as well as the changes in the particle sizes after the interaction arekeycomponentsto better understand laser-inducedwater condensation.

References

1.P. Rohwetter,J. Kasparian,K. Stelmaszczyk,Z. Hao,S. Henin,N. Lascoux,W. Nakaema,
Y. Petit, M. Queisser, R. Salame, E. Salmon, L.Woeste, J-P.Wolf, "Laser-induced water condensation in air", Nature Photonics 4, p. 451 (2010)

2. M. Durand and et al., "Kilometer range filamentation," Optics Express, vol. 21, no. 22, pp. 26836-45 (2013)

3.F. Courvoisier,V. Boutou,J. Kasparian,E. Salmon andG. Mejean, "Ultraintense light filaments transmitted through clouds," Applied Physics Letters, vol. 83, no. 2, pp. 213-215 (2003)

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