

Abstract Submitted  
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**Laser Induced Avalanche Ionization in Gases with REMPI or Femtosecond Pre-Ionization** MIKHAIL SHNEIDER, RICHARD MILES, Princeton University — Results of a theoretical study regarding the minimal requirements for the first pre-ionizing pulse to initiate avalanche ionization and essential gas heating by the second pulse are presented. The problem of minimal gas component density for the REMPI (Resonance Enhanced Multi-Photon Ionization) pre-ionization with subsequent avalanche ionization in a bulk gas is explored on the basis of the theoretical model developed for the Ar:Xe mixture, where during the initial portion of the pulse (3+1) REMPI of Ar atoms starts the ionization, which subsequently continues to grow with an avalanche in the buffer Xe gas [1]. Note, that this method of plasma generation at intensities much lower than required for breakdown is very close to one considered in ref. [2] with femtosecond pre-ionizing laser pulse. Scaling parameters for gas mixtures, laser pulse shape, focusing and frequency are studied. Possible applications for improving of the detection sensitivity of Radar REMPI diagnostic technique and laser initiated ignition are discussed.

1. M.N. Shneider, Z.Zhang, R.B. Miles, J.Appl.Phys. **104**, 023302 (2008); 2. Z. Henis, G. Milikh, K. Papadopoulos, A. Zigler, J.Appl.Phys. **103**, 103111 (2008)

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