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High Power Laser Self-Guiding in Mixed Gases BRADLEY POLLOCK, University of California, San Diego, JOSEPH RALPH, Lawrence Livermore National Laboratory, MOLLY BECKLER, University of the Pacific, FELICIE ALBERT, ART PAK, ANDREAS KEMP, SIEGFRIED GLENZER, Lawrence Livermore National Laboratory — Laser Wakefield Accelerators rely on self-guiding of short pulse high power lasers to drive relativistic plasma waves over centimeter-scale distances. The plasma is generally comprised of fully ionized Helium in order to reduce the effects of ionization-induced defocusing at the head of the laser pulse. However, the addition of higher-Z gases to the Helium background has been shown to aid in the trapping of electrons in the wakefield at low densities. We present experimental results of laser self-guiding in a gas cell over a distance of 4 mm using a nominally 100 TW Ti:Sapphire Laser in He/N2 mixtures over the range of 0-100% N2 by partial pressure. Self-guiding is also observed in He/Ar mixtures with Argon concentrations as high as 10% for electron densities of 5 - 10 (10^{18} cm^{-3}). Measurements of the relative laser pulse transmission, exit spot size and imaged spectrum will be presented. This work was performed under the auspices of the U.S. Department of Energy by Lawrence Livermore National Laboratory under Contract DE-AC52-07NA27344.

Bradley Pollock
University of California, San Diego

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