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High power laser guiding in a capillary discharge waveguide at LBNL BOB NAGLER, CSABA TOTH, WIM P. LEEMANS, LBNL, ANTHONY GONSALVES, SIMON HOOKER, Oxford University, CATALIN FILIP, TOM COWAN, UNR, LOASIS LAB AT LBNL TEAM, OXFORD UNIVERSITY TEAM, UNIVERSITY OF NEVADA, RENO TEAM — We will present progress on guiding experiments of a high power, short pulse laser in a capillary discharge waveguide. In the experiments, capillaries are used that are produced by laser machining 200-400 micron slots in sapphire plates. The capillary is then filled with hydrogen gas (1-9 10^{18}cm^3) and fully ionized by an electric discharge. Ohmic heating and diffusion create a parabolic plasma density profile that is ideally suited to guide the laser beam. Past experiments have shown guiding efficiencies of up to 90%, with clean Gaussian mode profiles [1]. We will present progress towards guiding record-high intensities (10^{18}W/cm^2 and above) in these structures using the LOASIS laser system at LBNL, focusing on a regime where relativistic guiding effects start playing a role. Applications of this waveguide as an accelerating structure in a Laser Wakefield Accelerator will be discussed. This work is supported by US DoE, DE-AC02-05CH11231 and in part by the Research Councils UK, Basic Technology Program (GR/R88090), DOE/NNSA under UNR grant DE-FC52-01NV14050, NSF, and AFOSR. [1] D. J. Spence, A. Butler, S. M. Hooker, J. Opt. Soc. Am. B, **20**, p138, 2003

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