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**Focusing of a 100 Gw Laser With an Open Waveguide** RYAN MURPHY, West Virginia University, JAMES ROSENZWEIG, RODION TIKHOPLAV, SERGEI TOCHITISTY, GALEN REED, University of California, Los Angeles — High laser power makes closed waveguides problematic due to ohmic power loss on the metallic walls and plasma formation at the boundaries, while the series of apertures of an open iris waveguide, which are much larger than the laser wavelength, provide at least 70% laser power transmission over 10 cm. We present initial designs and measurements of the open waveguide used to guide a plane polarized TEM mode, 10.6 micrometer, 100 Gw laser pulsed at 200 ps pulse length over a 10 cm path length at a beam waste optimized for low power loss at 0.5mm. This waveguide will be used in an Inverse Free Electron Laser (IFEL) acceleration scheme in the Neptune laboratory at UCLA. Initial measurements are performed with a low power CO2 laser and once design limitations are optimized in this regime measurements will be taken at higher powers where design problems such as plasma formation at the aperture boundaries may need to be considered. Other problems such as initial coupling of the beam into the apertures and phase lag of the beam are also addressed.

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