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# Propagation of high-intensity femtosecond laser pulses through ablating metal waveguides

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Recent experiments at the Institute of Laser Physics SB RAS are reported. In the experiments, high-intensity, high-contrast (<1e-8), 50 fs laser pulses propagate through 20-mm-long, about 0.05-mm-wide copper waveguides of the triangular cross-section. The triangular shape is chosen for its manufacturability. The transmission through waveguides is 70% for input intensities up to 1e17 W/cm2. The copper reflectivity in vacuum, helium, and air is measured in the intensity range of 1e10-1e17 W/cm2. No reflectivity decrease in vacuum and helium is observed, which leads to the conclusion that copper waveguides can efficiently guide laser pulses of intensities up to 1e19 W/cm2 on the waveguide axis (that corresponds to 1e17 W/cm2 on the walls). The transmission efficiency linearly decreases with the number of transmitted pulses because of plug formation inside the waveguide. The waveguide lifetime decreases exponentially with the energy of the laser pulse. In general, experimental results show that there are no stoppers found on the path to guiding higher intensity pulses by plasma-walled metal waveguides for the laser wakefield acceleration.

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