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Experimental study of the unmatched regime for laser-driven wakefield acceleration

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The report is devoted to the latest experimental results on the laser-driven acceleration of electrons obtained at the laser-plasma setup PEARL (IAP RAS, Russia). The main goal of the experimental campaign was to demonstrate in the laboratory an unmatched LPA regime, leading to higher acceleration gradients. Electrons with energies exceeding GeV were demonstrated for ~ 10 J, 50 fs laser pulses focused with an f/40 focusing mirror into a two-section gas cell with controlled interaction length. The gas concentration was chosen so that the plasma wavelength was several times smaller than the scale of the focal spot. Particular attention was paid to possible ambiguity of the spectrum reconstruction procedure.

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