quanta. Spectral measurements of the aluminum plasma radiation with spatial resolution by the pinch radius have shown that the effective transversal size (diameter) of the pinch is around the value of 1.5 mm. Within the framework of the stationary collisional-radiative model, in respect of the [H]- and [He]-like ion spectral lines relative intensities, the parameters of the aluminum plasma pinch, namely, the electron temperature T_e~550 eV and electron density $n_e \sim 3\times10^{20}$ cm^{-3} have been determined.

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P21.
Spectral phase shift and residual angular dispersion of an acousto-optic programmable dispersive filter

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There is an increasing demand for active and precise dispersion control of ultrashort laser pulses. In chirped pulse amplification (CPA) laser systems, the dispersion of the optical elements of the laser has to be compensated at least to the fourth order to obtain high temporal contrast compressed pulses. Nowadays the most convenient device for active and programmable control of spectral phase and amplitude of broadband laser pulses is the acousto-optic programmable dispersive filter (AOPDF) [1], claimed to be able to adjust the spectral phase up to the fourth order. Although it has been widely used, surprisingly enough there has been only a single, low resolution measurement [2] reported on the accuracy of the induced spectral phase shift of the device. In our paper we report on the first systematic experiment aiming at the precise characterization of an AOPDF device. In the experiment the spectral phase shift of the AOPDF device was measured by spectrally and spatially resolved interferometry, which is especially powerful tool to determine small dispersion values with high accuracy [3]. Besides the spectral phase dispersion, we measured both the propagation direction angular dispersion (PDAD) [4] and the phase front angular dispersion (PhFAD) [5]. Although the two quantities are equal for plane waves, there may be noticeable difference for Gaussian pulses. PDAD was determined simply by focusing the beam on the slit of an imaging spectrograph, while PhFAD was measured by the use of an inverted Mach-Zehnder interferometer [5] and an imaging spectrograph.

In the measurements, the spectral phase shift and both types of angular dispersion have been recorded upon the systematic change of all the accessible functions of the acousto-optic programmable dispersive filter. The measured values of group delay dispersion (GDD) and third order dispersion (TOD) have been found to agree with the preset values within the error of the measurement (1fs^2 and 10fs^3, respectively). In case of continuous mode operation of the AOPDF, the angular deviation and angular dispersion was found to vary more than 0.15 mrad and 1 mrad/μm when the GDD was changed from 0fs^2 to $\pm10^4$ fs^2. This effect is attributed to thermally induced refractive index gradient in the acousto-optical crystal caused by the dissipated acoustic power. In low repetition rate triggered mode, however, this phenomenon was experimentally negligible. In all cases the angular dispersion had actually a non-zero offset value of 0.5 μrad/nm, but this is practically negligible in almost every case of use.

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