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Formation of plasma channels and mini-filaments under tight focusing of femtosecond laser pulses in air ANDREY IONIN, SERGEY KUDRYASHOV, LEONID SELEZNEV, DMITRY SINITSYN, ELENA SUNCHUGASHEVA, Lebedev Physical Institute of Russian Academy of Sciences, YURII GEINTS, ALEKSANDR ZEMLYANOV, Institute of Atmospheric Optics, Siberian Branch of Russian Academy of Sciences, PROJECT 11-02-01100 OF RUSSIAN FOUNDATION FOR BASIC RESEARCH COLLABORATION, LEBEDEV INSTITUTE AND INSTITUTE OF ATMOSPHERIC OPTICS TEAM — The peculiarities of self-focusing and filamentation of high-power femtosecond laser pulses focused in air at various numerical apertures (NA) of focusing lens were experimentally and theoretically studied. The effect of multi-filamentation and formation of mini-filaments under tight focusing was experimentally observed and theoretically confirmed. The influence of the NA on the main characteristics of initiated plasma channels such as their radius R , length and concentration of electrons was studied. It was demonstrated that under the tight focusing of a laser beam (NA higher than 0.05) the decrease of transverse dimension of the plasma channel is discontinued at the level of R equals 2 - 4 micron. These mini-filaments were demonstrated to be an efficient and compact source of the third harmonic generation in UV spectral range.

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