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Intense light pulses generated by parametric instabilities in laser-plasma interaction CATERINA RICONDA, LULI Université Pierre et Marie Curie, STEFAN WEBER, ELI Institute of Physics of the ASCR, JULIEN FUCHS, LULI Ecole Polytechnique, LIVIA LANCIA, Università di Roma La Sapienza, JEAN-RAPHAEL MARQUÈS, LULI Ecole Polytechnique, GÉRARD MOUROU, IZEST Ecole Polytechnique — Due to their extremely high damage threshold, plasmas can sustain much higher light intensities than conventional solid state optical materials. Because of this lately much attention has been devoted to the possibility of using parametric instabilities in plasmas to generate very intense light pulses. Alternative to short-pulse amplification based on the Raman approach, it is shown that using Brillouin in the so called strong-coupling regime (sc-SBS) has several advantages and is well suited to amplify and compress laser seed pulses on short distances to high intensities. We present here recent multi-dimensional kinetic simulations that show the feasibility of achieving amplified light pulses with high efficiency. Shaping the plasma and extending the laser beams diameter allows for effective energy transfer from the pump to the seed while minimizing other unwanted plasma processes. In order to obtain amplification to of up to 10^{18} W/cm^2, we reduced the pulse duration of the initial seed to the order of ten femtoseconds. As the seed is amplified, the spectrum of the seed evolves and changes considerably so that it cannot be explained anymore by sc-SBS only: a mixing between SRS- and SBS-aspects (mixed mode regime) takes place.

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