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Efficient laser pulse amplification by stimulated Brillouin scattering PETER NORREYS, Clarendon Laboratory, University of Oxford, STFC, Rutherford Appleton Laboratory, E. GUILLAUME, STFC, Rutherford Appleton Laboratory, Ecole Polytechnique, K. HUMPHREY, University of Strathclyde, H. NAKAMURA, Blackett Laboratory, Imperial College London, R.M.G.M. TRINES, STFC, Rutherford Appleton Laboratory, R. BINGHAM, University of Strathclyde, STFC, Rutherford Appleton University — The energy transfer by stimulated Brillouin backscatter from a long pump pulse (15 ps) to a short seed pulse (1 ps) has been investigated in a proof-of-principle experiment. The two pulses were both amplified in different beamlines of a Nd:glass laser system, had a central wavelength of 1054 nm and a spectral bandwidth of 2 nm, and crossed each other in an underdense plasma in a counter-propagating geometry, off-set by 10 degrees. It is shown that the amplification factor and the wavelength of the generated Brillouin peak depends on the plasma density, the intensity of the laser pulses and the competition between two-plasmon decay and stimulated Raman scatter instabilities, by comparison with particle-in-cell simulations. The highest obtained energy transfer from pump to probe pulse was 2.5%, at a plasma density of 0.17ncr, and this energy transfer increases significantly with plasma density. The results suggest that much higher efficiencies can be obtained when higher densities (above 0.25ncr) are used in future experiments. This work was done in Collaboration with IST, Imperial College, Queens University Belfast, Osaka University & University of Cambridge

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