Abstract Submitted
for the DPP15 Meeting of
The American Physical Society

Influence of chirp on laser-pulse amplification in Brillouin backscattering schemes[1] GOETZ LEHMANN, FRIEDRICH SCHLUCK, KARL-HEINZ SPATSCHEK, Heinrich-Heine University Duesseldorf, Germany — Plasma-based amplification of laser pulses is currently discussed as a key component for the next generation of high-intensity laser systems, possibly enabling the generation of ultra-short pulses in the exawatt-zetawatt regime [1]. In these scenarios the energy of a long pump pulse (several ps to ns of duration) is transferred to a short seed pulse via a plasma oscillation. Weakly- and strongly-coupled (sc) Brillouin backscattering have been identified as potential candidates for robust amplification scenarios. With the help of three-wave interaction models, we investigate the influence of a chirp of the pump beam on the seed amplification. We show that chirp can mitigate deleterious spontaneous Raman backscattering of the pump off noise and that at the same time the amplification dynamics due to Brillouin scattering is still intact [2, 3]. For the experimentally very interesting case of sc-Brillouin we find a dependence of the efficiency on the sign of the chirp.

[1] G.A. Mourou, N.J. Fisch, V.M. Malkin, Z. Toroker, E.A. Khazanov, A.M. Sergeev, T. Tajima, and B. Le Garrec, Optics Communications 285, 720 (2012)
[2] G. Lehmann and K.H. Spatschek, Phys. Plasmas 22, 043105 (2015)
[3] F. Schluck, G. Lehmann, and K.H. Spatschek, Phys. Plasmas, to be published (2015)

[1]Funding provided by project B10 of SFB TR18 of the Deutsche Forschungsgemeinschaft (DFG)

Goetz Lehmann
Heinrich-Heine University Duesseldorf, Germany

Date submitted: 24 Jul 2015 Electronic form version 1.4