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Amplification of ultra-short laser pulses via strongly-coupled Brillouin backscattering[1] GOETZ LEHMANN, FRIEDRICH SCHLUCK, KARL-HEINZ SPATSCHEK, Heinrich-Heine University Duesseldorf — 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. Strongly-coupled Brillouin (sc-SBS) backscattering is identified as a potential candidate for robust amplification scenarios [2]. With the help of three-wave interaction models, we investigate the multi-dimensional dynamics the seed pulse undergoes during amplification. The influences of filamentation and self-focusing are analyzed and mitigation strategies are discussed.

[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* 20, 073112 (2013)

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