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Spatial temporal couplings and the generation of Stimulated Raman Side Scattering

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We report on experiments investigating the influence of spatio-temporal couplings (STCs) in the laser focus on stimulated Raman Side Scattering. We find a discrepancy between measured scattered angles and classical theory. At the same time, the angle changes with propagation of the driving laser pulse. This mismatch can be resolved if the pulse front tilt (PFT) of the laser pulse is taken into account. We developed an analytic model to describe the propagation of a Gaussian laser pulse exhibiting first order STC around the focal plane, which describes the observed behaviour. Using 2D-PIC Simulations we can reproduce the experimental results and observe phase matching between the driving pump pulse, the plasma k -vectors and the scattered light. As a result, the PFT of a laser pulse excites larger plasma k -vectors, which leads to a larger scattering angle.

Acknowledgments

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