



Contribution ID: 20

Type: not specified

Amplifying ultrashort high intensity laser pulses using Self Phase Modulation

Tuesday, 29 October 2024 10:55 (25 minutes)

One of the fundamental goals of laser science is obtaining laser beams with larger and larger intensities. The most widely used methods for such are CPA (Chirped Pulse Amplification) and its derivatives, which are fundamentally limited due to LIDT (Laser Induced Damage Threshold) of components used. One of the solutions proposed is using SPM (Self Phase Modulation), which involves spectral broadening using non-linear materials, lowering the Fourier Transform Limit (FTL) duration of the pulse, enabling an increase in intensity after compression.

In this presentation, I will outline the principles and challenges of SPM, and present my work on LIDT data analysis, 1D SPM simulations and the experiment performed at CLPU.

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Session Classification: Oral contributions II