

Title: Ultra-efficient laser-material processing in the ablation-cooled regime

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Abstract:

This talk will describe advances in laser-material processing operating in the recently demonstrated ablation-cooled regime (Ilday, et al., Nature, 2016), which is accessed with ultrafast pulse repetition rates in the range of multi-GHz, in contrast to traditional ultrafast regime using kHz repetition rates. We will show results obtained on various materials, including soft and hard biological tissue, using pulse energies in the nanojoule range with potentially revolutionary implications for laser surgery. Despite the use of pulse energies that are orders of magnitude smaller than those typically used, significantly higher ablation efficiencies are obtained as a result of the unique physics of the ablation-cooled regime based on a great many of pulses interacting with the target *collectively*.