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Measuring the energy of amplified spontaneous emission (ASE) in a short pulse laser amplifier MARIN ILIEV, DANIEL ADAMS, MICHAEL GRECO, AMANDA MEIER, JEFF SQUIER, CHARLES DURFEE, Colorado School of Mines — In high-gain pulsed laser amplifiers, amplified spontaneous emission (ASE) tends to limit the gain in single stage fiber amplifiers. Even if ASE is not strong enough to deplete the gain of the amplifier, it still contributes strongly to a low-intensity background output in the amplified signal. The intensity contrast between the amplified short pulse and this background ASE pedestal can be measured with third-order autocorrelation, but this method cannot be used to completely specify the ASE's energy, which is distributed over many nanoseconds. We have developed a novel method that allows us to determine the energy and the spectrum of the ASE. We use a cross polarized wave (XPW) generating crystal such as BaF₂ to “clean up” the ASE from the short pulse(SP). The input pulse (SP and ASE) and the cross-polarized signal are passed through a birefringent crystal such as sapphire. The relative group velocity difference along each crystal axis results in a delay between both channels. After passing through a polarizer, an interferogram is obtained in a spectrometer. This interferogram results from interference of the XPW pulse with the short-pulse content of the amplifier output, with a background of the ASE spectrum. Fourier analysis yields both the ASE energy and its spectrum.

Charles Durfee
Colorado School of Mines

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