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Amplification of flat laser pulse train

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Abstract: We present modeling and measurements of flattop amplification of a laser pulse train in a diode pumped Nd:YLF system. We establish a theoretical model, accounting for the transverse Gaussian shape of an amplified laser beam, in order to explain remaining slopes in the pulse train energy. The influence of the transverse Gaussian shape on the train's flatness has been experimentally verified. Based on the model we are able to increase the total amplification of a long train of infrared seed beam in the drive laser system at the Fermilab Accelerator Science and Technology facility. The single-pass amplifier improvements resulted in a gain of ~7 with flat output pulse train for up to 1000 seed pulses.