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High-efficiency phase-shaped ultra-broadband non-collinear optical parametric amplifier (NOPA) ANDREI FLOREAN, ELIZABETH CARROLL, BRETT PEARSON, ROSEANNE SENSION, PHILIP BUCKSBAUM, FOCUS Center at The University of Michigan — We present an improved NOPA scheme, which allows us to generate ultra-broadband pulses, extending from 490nm to 830nm. The beam's spatial profile is Gaussian, with 5μJ typical energy, while the input blue energy is 15μJ/45μJ respectively for the 2 passes (8% efficiency). The design is based on two stages amplification in 2mm thick BBO crystals, and it uses a Pellin-Broca prism placed in the pump's path. The purpose of the prism is to stretch the pump in time and to increase its chromatic angular divergence, both effects enhancing the amplified bandwidth. In addition we present a software model, which predicts the best non-collinear NOPA angle for a set pump central wavelength and desired amplified bandwidth. We phase-shape the NOPA output in a 4f prism-based shaping system, by means of a 128 pixels liquid crystal modulator (LCM), with less than 35% losses. Because of the limited LCM size we decrease the NOPA bandwidth. The compression is coarsely attained with a BK7 prism compressor and then finely tuned with the LCM, by using a SHG signal in a 40 μm BBO crystal as feedback in a genetic algorithm (GA) run. The output is used in molecular feedback-controlled experiments.

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