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Active pulse synchronization for OPCPA systems MORITZ UEFFING, Technische Universitaet Muenchen, THOMAS METZGER, Ludwig-Maximilians-Universitaet Muenchen, YUNPEI DENG, ALEXANDER SCHWARZ, FERENC KRAUSZ, Max Planck Institute of Quantum Optics, REINHARD KIENBERGER, Technische Universitaet Muenchen, Max Planck Institute of Quantum Optics — The parametric amplification in nonlinear crystals requires both spacial and temporal stability of pump and seed pulses to attain stability of the amplified pulse. Especially the development of thin disk pump sources with pulse lengths down to $2\,ps$ requires a temporal stability well beyond $100\,fs$. To reduce the timing shifts between pump and seed pulses in OPCPA systems we introduce a novel, active pulse synchronization system combining a high precision translation stage and a piezo-electric driven mirror. The timing jitter reduction of OPCPAs with kHz repetition rate demands a fast detection system allowing nearly shot to shot correction. Therefore the spectrum of a cross-correlation between the $1030\,nm$, $1\,nm$ bandwidth pump and a broad bandwidth Ti:Sa seed pulse stretched to $10\,ps$ in a BBO crystal is directly and in real time measured using a position sensitive detector. This method can easily be adopted to other OPA/OPCPA systems giving the chance to correct not only for slow drifts but also for fluctuations up to $300\,Hz$.

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