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Spectrum-polarization encoding for broadband laser pulses basing on rotatory dispersion and its possible applications

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A swe know, Chirped Pulse Amplification (CPA), a kind of time-spectrum encoding, has scaled the femto-second pulse to several petawatts. Here we report a novel technology; we call it spectrum-polarization encoding (SPE) for broadband pulse. SPE can originate from the optical rotatory dispersion of some optical active materials, e.g. quartz crystal, and can be compensated by inducing equal value of the rotatory dispersion but with opposite sign. By using Ti:S as a polarization-dependent gain, our calculations show proper SPE allows an amplifier to boost an 800 nm pulse up to mJ level with a bandwidth to support few-cycle pulse duration. Further, M. Kalashnikov claimed that SPE might open a way to produce PW few-cycle laser pulses in a CPA system. We also find SPE may be able to tune output spectrum of a tunable laser with a polarization-dependent gain medium, to shape the ultrashort pulses by inducing polarization-dependent loss, to manipulate the nonlinear frequency conversion by encoding the refractive indices via the frequent components of the pumping pulses in a birefringent crystal and so on.

Biography

Shixiang Xu has completed his PhD in 1998 from Shanghai Institute of Optics and Fine Mechanics, China. His current position is a Professor in Shenzhen University. His research interests include ultrashort pulse laser, ultrafast imaging and pulsed terahertz optics. Till now, he has published more than 60 papers in peer-reviewed journals and 15 patents. He also serves as a member of Laser Professional Committee of Chinese Optical Society. Recently, he has been elected to the Council of Guangdong Optical Society of China.

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