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Designing the Femtosecond Optical Oscilloscope

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We present the results of our recent experimental and numerical studies on femtosecond pulse spectrotemporal imaging in similariton-induced temporal lens aimed to design a femtosecond optical oscilloscope [1]. We studied nonlinear and dispersive peculiarities of modern high-tech materials, such as photonic crystal fibers, hollow-core fibers etc, to use them in the scheme, and provide compactness and reliability of device. The use of hollow-core fibers, as a dispersive medium instead of pair of prisms or gratings, is of special importance for constructing the industrial tool. Additionally, we are experimenting on the method of dispersive Fourier transformation, using the effect of chromo-modal dispersion in multimode fibers [2], to provide real-time performance of the device.

[1] A.Zeytunyan, A.Muradyan, G.Yesayan, L.Mouradian, F.Louradour, A.Barthélémy “Generation of broadband similaritons for complete characterization of femtosecond pulses,” Opt. Commun. **284** (15), 3742–3747 (2011).

[2] E. Diebold, N. Hon, Z. Tan, J. Chou, T. Sienicki, C. Wang, and B. Jalali “Giant tunable optical dispersion using chromo-modal excitation of a multimode waveguide” Vol. 19, No. 24, Optics Express 23817 (2011).