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Single-grating and single-grism pulse compressors. VIKRANT CHAUHAN, PAMELA BOWLAN, JACOB COHEN, RICK TREBINO, GEORGIA INSTITUTE OF TECHNOLOGY TEAM — We introduce single-diffraction element pulse compressors, which use a single grating or a grism, and are compact and automatically aligned for distortion-free output. A pulse compressor adds negative GDD by introducing angular dispersion, which yields negative GDD but also introduces other spatio-temporal distortions, like spatial chirp and pulse-front tilt, which must be removed before using the pulse. They have four (or two) identical dispersive elements, arranged, not only to introduce negative GDD, but also to then compensate for the spatio-temporal distortions. So, traditional designs are bulky and difficult to align for zero spatio temporal distortions. We recently solved these problems in our single-prism pulse compressor. But prism compressors have limited negative GDD. Using gratings increases the GDD but gratings have a negative ratio of third-order dispersion (TOD) to GDD, materials introduce a positive ratio, so, they cannot compensate for both simultaneously. A single grism pulse compressor solves this problem and adds large amounts of negative GDD. In addition, it is compact, is auto-aligned for distortion-free output, and has a tunable TOD-to-GDD ratio, so it can compensate for a wide range of materials.

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