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Adaptive engineering of coherent soft-x-rays by temporal and spatial laser-pulse shaping THOMAS PFEIFER, RON KEMMER, ROBERT SPITZENPFEIL, DOMINIK WALTER, CARSTEN WINTERFELDT, CHRISTIAN SPIELMANN, GUSTAV GERBER, Universitaet Wuerzburg — We demonstrate qualitative amplitude shaping of the coherent soft x-ray spectrum produced in the process of high-harmonic generation. This is accomplished by applying adaptive femtosecond pulse shaping methods. We performed the basic operations of complete spectral control by 1) selective generation of extended parts of the high-harmonic spectra, 2) tunable single harmonic generation and 3) creation of spectral holes (suppression of harmonics) in the plateau region of the spectrum. Our ability to qualitatively "engineer" the coherent spectral properties by application of temporal and spatial laser-pulse-shaping methods has immediate consequences for the developing field of attosecond x-ray science. Control over the spectrum is directly related to the control over the attosecond pulse shape as we will show by comparing experiment with simulation. In addition, even more important is the prospect to extend the field of coherent control into the soft x-ray range. In the future, the proposed technique will allow us to directly manipulate electronic motion on its natural attosecond time scale.

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