

# Efficient high-order harmonic generation via surface plasma compression with lasers

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The efficiency of high-order harmonic generation from a relativistic laser interacting with solid targets depends greatly on surface plasma distribution. The usual method of enhancing efficiency involves tuning the plasma scale length carefully by improving the laser contrast [1,2]. Here, we experimentally demonstrate that efficient harmonics can be achieved directly by compressing large-scale surface plasma via the radiation pressure of a circularly polarized normally incident prepulse. The harmonic generation efficiency obtained by this method is comparable to that obtained with optimized plasma scale length by high-contrast lasers, and the harmonic spectrum plateaus at high orders. Our scheme does not rely on high-contrast lasers and is robust and easy to implement. Thus, it may pave a way for the development of intense extreme ultraviolet sources and future applications with high repetition rates. Moreover, our studies also reveal that the preplasma can be actively tailored into a curved surface using the radiation pressure of a normally incident prepulse. This may also be an efficient way to focus relativistic harmonics [3] or to produce high-order vortex harmonics [4].

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