

Title	Supplementary Information: Light-Field-Driven Currents in Graphene
Authors	Takuya Higuchi ¹ , Christian Heide ¹ , Konrad Ullmann ² , Heiko B. Weber ² & Peter Hommelhoff ¹
Publication	<i>Nature</i> 550, 224–228 (12 October 2017) doi:10.1038/nature23900
Abstract (Sample Preparation)	<p>Monolayer graphene is grown epitaxially on a step-bunched 6H-SiC(0001) substrate.³¹ A graphene stripe with a width of $2.0 \pm 0.1 \mu\text{m}$ is patterned on a single terrace step by electron beam lithography and plasma etching. Two gold electrodes (thickness of 50 nm) with titanium adhesive layers (thickness of 5 nm) are deposited on the stripe ends, with a distance of $4.0 \pm 0.1 \mu\text{m}$ between them (Extended Data Fig. 1a).</p> <p>The graphene is n-doped, with a carrier concentration of $n = (8.0 \pm 0.9) \times 10^{12} \text{ cm}^{-2}$ and a carrier mobility of $\mu = 860 \pm 60 \text{ cm}^2 \cdot \text{V}^{-1} \cdot \text{s}^{-1}$, determined by Hall and conductivity measurements. The corresponding Fermi energy is $E_F = 0.3 \text{ eV}$, which implies that the plasmonic response of electrons (and thus screening) is negligible around the photon energies ($\approx 1.5 \text{ eV}$) employed.¹⁰</p> <p>We place the sample in a vacuum chamber with a base pressure of $3 \times 10^{-8} \text{ mbar}$. The measurement is done at room temperature.</p> <p>At the junctions between graphene and the electrodes, built-in fields are formed due to the mismatch of the work functions. These built-in fields produce a CEP-independent photocurrent when the junctions are illuminated. We minimize this CEP-independent photocurrent by aligning the laser spot position to the middle of the graphene stripe (Extended Data Fig. 1b).</p>
Laser Quantum Product	venteon power
Institute	<p>¹Laser Physics, Department of Physics, Friedrich-Alexander-Universität Erlangen-Nürnberg (FAU), Staudtstrasse 1, D-91058 Erlangen, Germany.</p> <p>²Applied Physics, Department of Physics, Friedrich-Alexander-Universität Erlangen-Nürnberg (FAU), Staudtstrasse 7, D-91058 Erlangen, Germany.</p>