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Gate tunable self-powered few-layer black phosphorus broadband photodetector

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Figure S1 Band structure of three-layer BP when (a₁) $V_g = 0 \text{V}$; (a₃) $V_g = 6 \text{V}$; (a₄) $V_g = 11 \text{V}$. (a₂) The projected density of states (PDOS) of three-layer BP when $V_g = 0 \text{V}$. (b) Band gap $E_g$ of three-layer BP versus the applied vertical gate voltage $V_g$ in the system.
Figure S2 (a,b) The photoresponse of three-layer BP device along armchair direction versus photon energy $E$ and the gate voltage $V_g$ by circularly polarized photogalvanic effect (CPGE), respectively. (c,d) Photore- sponse of three-layer BP device along zigzag direction versus photon energy $E$ and the gate voltage $V_g$ under illumination by CPGE, respectively. The polarization angle $\phi = 45^\circ$. 

\[ R(a_0^2/\text{photon}) \times 10^{-3} \]
Figure S3 (a,b) The photoresponse versus the circular polarization angle $\phi$ along the armchair and zigzag directions, respectively. (c,d) The three components of the photoresponse versus the circular polarization angle $\phi$ along the armchair and zigzag directions, respectively. The three-layer BP device is illuminated by the circularly polarized light. The photon energy is fixed as $E = 0.025\text{eV}$. 
Figure S4 (a) The extinction ratio versus with photon energy along the armchair and zigzag directions, respectively.