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Quantized circular photogalvanic effect in Weyl semimetals FERNANDO DE JUAN, Oxford University, ADOLFO G. GRUSHIN, TAKAHIRO MORIMOTO, JOEL E. MOORE, University of California, Berkeley — The circular photogalvanic effect (CPGE) is the part of a photocurrent that switches depending on the sense of circular polarization of the incident light. It has been consistently observed in systems without inversion symmetry and depends on non-universal material details. We find that in a class of Weyl semimetals (e.g. $SrSi_2$) and three-dimensional Rashba materials (e.g. doped Te) without inversion and mirror symmetries, the CPGE trace is effectively *quantized* in terms of the combination of fundamental constants $\frac{e^3}{h^2 c\epsilon_0}$ with no material-dependent parameters. This is so because the CPGE directly measures the topological charge of Weyl points near the Fermi surface, and non-quantized corrections from disorder and additional bands can be small over a significant range of incident frequencies. Moreover, the magnitude of the CPGE induced by a Weyl node is relatively large, which enables the direct detection of the monopole charge with current techniques.

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