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Topological Imbert-Fedorov Shift in Weyl Semimetals[1] QING-DONG JIANG, Peking Univ, HUA JIANG, Soochow Univ, HAIWEN LIU, QING-FENG SUN, XIN-CHENG XIE, Peking Univ — The Goos-Hnchen (GH) shift and the Imbert-Fedorov (IF) shift are optical phenomena which describe the longitudinal and transverse lateral shifts at the reflection interface, respectively. Here, we predict the GHIF shifts in Weyl semimetals (WSMs)a promising material harboring low energy Weyl fermions, afermionic cousin of photons. Our results show that the GH shift in WSMs is valley independent,is analogous to that discovered in a 2D relativistic materialgraphene. However, the IF shift hasbeen explored in nonoptical systems, and here we show that it is valley dependent. Furthermore, wethat the IF shift actually originates from the topological effect of the system. Experimentally, theIF shift can be utilized to characterize theWeyl semimetals, design valleytronic devices of high, and measure the Berry curvature. Morever, we investigate the transport properties of topological semimetal using the wave-packet dynamics, which give some interesting results.

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