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Surface-bulk charge transfer and surface Luttinger arc in Weyl semimetals OSAKPOLOR OBAKPOLOR, PAVAN HOSUR, University of Houston — Beyond our classification of materials based on their electrical conductivity; metals, insulators, semiconductors and semimetals, we have materials whose properties are unique due to their topology. Here, we study one example of these topological materials with promising applications ranging from fabrication of more efficient electronics to spintronic devices and photovoltaic applications; Weyl semimetals. Weyl semimetals are 3D materials in which non-degenerate conduction and valence bands cross at certain points in the Brillouin zone. Although theoretical predictions of this material started in 2011, it was not until 2015 experimental discovery was made. On the surface of this material, there exist states called the Fermi arcs and the surface properties are different from those of the bulk. However, interestingly the surface and the bulk are coupled. In this work, we analyze one of the physical quantity that the consequence of this coupling shows up; the particle number on the surface of this material. We show that the bulk also contribute to to the particle number on the surface. Furthermore, we prove the existence of a new feature of this material which has been missed all these years; the Luttinger arc.

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