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Winding number and optical conductivity of multi-Weyl semimetals[1] SEONGJIN AHN, Department of Physics and Astronomy, Seoul National University, EUGENE MELE, Department of Physics and Astronomy, University of Pennsylvania, HONGKI MIN, Department of Physics and Astronomy, Seoul National University — Multi-Weyl semimetals are a new type of Weyl semimetals which have anisotropic non-linear energy dispersion and a topological charge larger than one, thus exhibiting a unique quantum response. Using a unified lattice model we calculate the optical conductivity numerically in the multiWeyl semimetal phase and in its neighboring gapped states, and obtain the characteristic frequency dependence of each phase analytically using a continuum model. The frequency dependence of longitudinal and transverse optical conductivities obeys scaling relations that are derived from the winding number of the parent multi-Weyl semimetal phase and can be used to distinguish these electronic states of matter.

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