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Anomalous Hall currents induced by time-varying magnetic fields in a Weyl metal phase[1] IKSU JANG, JAE-HO HAN, KI-SEOK KIM, POSTECH
— A pair of Weyl points can be identified with a magnetic monopole and anti-monopole pair in momentum space. The Berry curvature generated by this monopole pair plays an essential role in anomalous transport phenomena of Weyl metals. Recalling that the relative position of the monopole pair is controlled by external magnetic fields, we apply time-varying magnetic fields to Weyl metals and investigate the role of an oscillating monopole pair in the transport. Based on Boltzmann transport theory with a topologically modified Drude model, we find that the oscillating monopole pair gives rise to anomalous Hall currents. We classify these Hall currents in all possible situations. We reveal that these anomalous Hall effects are involved with an extended chiral anomaly, where a time-varying chiral gauge field to represent the relative-distance vector of the monopole pair appears in the anomaly equation.

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