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The Wiedemann-Franz law in WP₂: zero-temperature validity, finite-temperature departure and the role of electron-electron scattering

The Wiedemann-Franz law, one of the oldest laws of the solid-state physics, survived the quantum revolution, which linked it to a ratio of fundamental constants. During the past decades, the experimental research on the validity or violations of the WF law in uncommon metals has finally confirmed its validity (within experimental resolution) in the zero-temperature limit in numerous cases, in spite of initial results. I will present our recent work on the Weyl semimetal WP₂ in this context. The zero-temperature validity is accompanied by a finite-temperature downward deviation, which is expected in presence of inelastic scattering. The Lorenz ratio emerges as an under-explored source of information on mobile electrons in solids. Comparison with the case of He³ is an enlightening source of inspiration in the quest for possible hydrodynamic signatures in transport properties of the electron fluid.