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A view of metals through the terahertz window

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As electrons move through a metal, interaction with their environment tends to slow them down, causing the Drude peak in the optical conductivity to become narrower. The resulting peak width is typically in the terahertz frequency range that sits between microwaves the far infrared, too fast for conventional electronics and too slow for conventional infrared spectroscopy. With femtosecond laser techniques, however, coherent, broadband terahertz radiation can now be generated and detected with exquisite sensitivity, providing a new window onto electronic interactions in metals. I will discuss the application of this technique to a variety of metallic systems, including elemental lead, the nearly magnetic oxide metal $CaRuO_3$, and CrV alloys that span the quantum phase transition from spin-density wave to paramagnetic metal.[1]

[1]M. A. Gilmore, S. Kamal, D. M. Broun, and J. S. Dodge, *Appl. Phys. Lett.* **88**, 141910 (2006).