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Influence of the Material Band Structure on Attosecond Many-Body Electron-Electron Interactions in Transition Metals. CONG CHEN, ZHENSHENG TAO, ADRA CARR, PIOTR MATYBA, JILA, University of Colorado, TIBOR SZILVSI, University of Wisconsin-Madison, SEBASTIAN EMMERICH, MARTIN PIECUCH, OPTIMAS, University of Kaiserslautern, MARK KELLER, NIST, Boulder, DMITRIY ZUSIN, JILA, University of Colorado, STEFFEN EICH, MARKUS ROLLINGER, OPTIMAS, University of Kaiserslautern, WENJING YOU, JILA, University of Colorado, STEFAN MATHIAS, OPTIMAS, University of Kaiserslautern, UWE THUMM, Kansas State University, MANOS MAVRIKAKIS, University of Wisconsin-Madison, MARTIN AESCHLIMANN, OPTIMAS, University of Kaiserslautern, PETER OPPENEER, Uppsala University, HENRY KAPTEYN, MARGARET MURNANE, JILA, University of Colorado — Many-body electron-electron interactions play prominent roles in correlated electron systems. Here we show that by using attosecond pulse trains, we can observe many-body electron-electron interactions that occur on attosecond timescales during photoemission. We extract the time delays associated with photoemission from occupied bands in Ni and Cu into free-electron final states. This allows us to show that photoemission from the d band of Cu is delayed by ˜100 attoseconds relative to photoemission from the same band of Ni. We attribute this difference to the fact that the d band in Ni is not fully occupied, resulting in enhanced electron-electron scattering. Finally, we present a unified picture of electron-electron interactions in transition metals across a broad energy range, from ˜0.5eV to 40eV.

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