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Correlation, doping, and interband effects on the optical conductivity of iron superconductors[1] LUCA DE 'MEDICI, European Synchrotron Radiation Facility, Laboratoire de Physique et Etude des Materiaux, CNRS/ESPCI/UPMC, France, MARIA J. CALDERON, BELEN VALENZUELA, ELENA BASCONES, ICMM-CSIC, Spain — Optical conductivity is one of the tools traditionally used to study strongly correlated systems. For single band systems, the interpretation of these data is rather straightforward and very well known. This is not the case for multiorbital systems, where electronic interactions lead to nontrivial features in the optical spectrum. We have studied the case of iron superconductors by means of a model that introduces the orbital dependent interactions. We find that interband transitions make a non-negligible contribution to the low-energy plateau found in the optical spectrum of undoped compounds and account for a large fraction of the spectral weight at the cutoff frequencies currently used to determine the Drude weight. This fraction is strongly enhanced in hole-doped samples as the larger effect of interactions towards half-filling strongly suppresses the Drude weight. We analyze the relationship between the Drude weight and the kinetic energy and their renormalizations. We show that with orbital differentiation, the renormalization of both the Drude weight and the kinetic energy are not equal, not even within a Fermi liquid picture. Phys. Rev B 90, 115128 (2014)

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Elena Bascones
ICMM-CSIC, Spain

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