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Electron dynamics in the bulk and at surfaces

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A fundamental concept in condensed matter physics is the notion of quasiparticle, an elementary excitation of an interacting Fermi liquid. The interaction between quasiparticles determines how long the corresponding quantum states retain their identity: a quasiparticle is said to have a lifetime, which sets the duration and, in combination with the velocity, the range of influence of the excitation. The quasiparticle lifetime enters the description of many important phenomena, for instance, the dynamics of charge and energy transfer at surfaces. We discuss the main physics involved in the determination of lifetimes and present results of electron and hole dynamics for bulk states and for surfaces. The new theoretical and experimental results for the lifetimes of holes in noble metal surfaces are in agreement, thus resolving a long-standing discrepancy between experiment and theory.

Short C.V. of P.M. Echenique

President of the Donostia International Physics Center and Professor of Condensed Matter Physics, University of the Basque Country. Ph. D. University of Cambridge (1976). Post-doctoral work at Oak Ridge National Lab. (USA) and as a Nordita Fellow in Lund and Copenhagen (Niels Bohr Institute).

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