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Two energy scales and the nodal-antinodal dichotomy in underdoped superconducting cuprates

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Recent electronic Raman scattering experiments on hole-doped cuprates in the underdoped regime reveal that nodal and antinodal regions behave in very different manners. I will present the conclusions of a theoretical analysis of these experiments, based on a new sum-rule, and on Fermi liquid and phenomenological considerations, which lead to the conclusion that the superconducting state involves a hitherto hidden energy scale, which has the same doping-dependence than the superconducting transition temperature, in contrast to the pseudogap energy scale. The low-frequency Raman response and the temperature-dependence of the superfluid density, both controlled by nodal excitations, are shown to behave in a qualitatively similar manner, which puts strong constraints on microscopic theories of the cuprates. For a reference and list of collaborators on this work, see: M. Le Tacon et al., Nature Physics, 2, 537 (2006).