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Universal increase in the superconducting critical temperature of two-dimensional semiconductors at low doping by the electron-electron interaction[1]

MATTEO CALANDRA, CNRS

In two-dimensional multivalley semiconductors, at low doping, even a moderate electron-electron interaction enhances the response to any perturbation inducing a valley polarization. If the valley polarization is due to the electron-phonon coupling, the electron-electron interaction results in an enhancement of the superconducting critical temperature. By performing first-principles calculations beyond density functional theory, we prove that this effect accounts for the unconventional doping dependence of the superconducting transition temperature (Tc) and of the magnetic susceptibility measured in LixZrNCI. Finally, we discuss what are the conditions for a maximal Tc enhancement in weakly doped two-dimensional semiconductors. References: M. Calandra, P. Zoccante and F. Mauri, Pys. Rev. Lett. 114, 077001 (2015) B. Pamuk, J. Baima, R. Dovesi, M. Calandra and F. Mauri, in prepararion.

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