Electronic structure and many-body effects in graphene @ Elettra

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Experimental results on the electronic structure and many body effects in graphene studied by high-resolution angle-resolved photoemission spectroscopy (ARPES) at the VUV, APE, and BaDElPh beamlines at Elettra will be presented. Experiments are performed on graphene grown in-situ on different transition metals and silicon-based multilayer substrates. Particular emphasis will be put on the electron doped graphene to search for the best dopant able to induce a high doping level and a strong electron-phonon coupling (EPC) to efficiently mediate superconductivity. A detailed analysis of the ARPES spectral function for dopants such as Li, Na, K, Rb, Cs, and Ca reveals the full electronic band structure, the Eliashberg function, and the superconducting critical temperature Tc. In particular, the case of Ca-doped graphene yields the highest EPC constant and estimation of Tc, providing experimental support for the superconductivity in graphene and highlighting the predictive power of the ARPES method.