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Strong Correlation Physics in Aromatic Hydrocarbon Superconductors[1] MASSIMO CAPONE, GIANLUCA GIOVANNETTI, CNR-IOM and International School for Advanced Studies (SISSA) — We show, by means of ab-initio calculations, that electron-electron correlations play an important role in doped aromatic hydrocarbon superconductors, including potassium doped picene with $T_c = 18K$ [1], coronene and phenanthrene [2]. For the case of picene the inclusion of exchange interactions by means of hybrid functionals reproduces the correct gap for the undoped compound and predicts an antiferromagnetic state for $x = 3$, where superconductivity has been observed [3]. The latter finding is compatible with a sizable value of the correlation strength. The differences between the different compounds are analyzed and results of Dynamical Mean-Field Theory including both correlation effects and electron-phonon interactions are presented. Finally we discuss the consequences of strong correlations in an organic superconductor in relation to the properties of Cs_3C_{60}, in which electron correlations drive an antiferromagnetic state [4] but also lead to an enhancement of superconductivity [5].

1. R. Mitsuhashi et al. Nature 464, 76 (2010)
2. X.F. Wang et al, Nat. Comm. 2, 507 (2011)
3. G. Giovannetti and M. Capone, Phys. Rev. B 83, 134508 (2011)
4. Y. Takabayashi et al., Science 323, 1585 (2009)
5. M. Capone et al. Rev. Mod. Phys. 81, 943 (2009

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