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Theoretical study of impurity effects in iron-based superconductors MARIA NAVARRO GASTIASORO, University of Copenhagen, PETER HIRSCHFELD, University of Florida, BRIAN ANDERSEN, University of Copenhagen — Several open questions remain unanswered for the iron-based superconductors (FeSC), including the importance of electronic correlations and the symmetry of the superconducting order parameter. Motivated by recent STM experiments which show a fascinating variety of resonant defect states in FeSC, we adopt a realistic five-band model including electronic Coulomb correlations to study local effects of disorder in the FeSC. In order to minimize the number of free parameters, we use the pairing interactions obtained from spin-fluctuation exchange to determine the homogeneous superconducting state. The ability of local impurity potentials to induce resonant states depends on their scattering strength V_{imp}; in addition, for appropriate V_{imp}, such states are associated with local orbital- and magnetic order. We investigate the density of states near such impurities and show how tunneling experiments may be used to probe local induced order. In the SDW phase, we show how C2 symmetry-breaking dimers are naturally formed around impurities which also form cigar-like (pi,pi) structures embedded in the (pi,0) magnetic bulk phase. Such electronic dimers have been shown to be candidates for explaining the so-called nematogens observed previously by QPI in Co-doped $CaFe_2As_2$.

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