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Electronic structure of iron-pnictide superconductors: just scratching the surface ERIK VAN HEUMEN, University of Amsterdam, J. VUORINEN, Tampere University, K. KOEPERNIK, IFW Dresden, F. MASSEE, Y. HUANG, J.B. GOEDKOOP, University of Amsterdam, M. LINDROOS, Tampere University, M. SHI, PSI, K. HAULE, Rutgers University, J. VAN DEN BRINK, IFW Dresden, M.S. GOLDEN, University of Amsterdam — Angle resolved photoemission (ARPES) and scanning tunneling microscopy (STM) are important tools in the study of iron-pnictide high T_c superconductors. These techniques are surface sensitive and one has to ensure that the electronic structure probed in an experiment corresponds to the bulk electronic structure. Using a combination of experimental techniques (STM, ARPES, LEED) and theoretical calculations (LEED simulations, DFT), I will show that the surface structure of $BaFe_{2-x}Co_xAs_2$ is both reconstructed and distorted. LEED data combined with simulations is used to solve the real surface and sub-surface structure. The impact of the surface on the electronic structure is then determined by comparing DFT slab calculations, based on the real surface structure, with ARPES experiments. The presence of surface states gives a natural explanation for the large k-space broadening observed in these materials. Having identified the surface states and bulk bands, I will address the more fundamental questions with regard to the electronic structure and its role in the mechanism of high temperature superconductivity.

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