

Feshbach resonances and multiband superconductivity near the misfit strain quantum critical point in the 3D phase diagram of high T_c superconductors

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The experiments on cuprates and FeAs superconductors have shown that the Global Phase Diagram requires a 3D phase diagram where the critical temperature T_c is dependent on two variables: the doping and the misfit strain called the Aeppli-Bianconi phase diagram. The material dependent variable is the internal chemical pressure due to the superlattice misfit strain between active layers and spacer layers that is an intrinsic physical parameter of superlattices at atomic limit. The mesoscopic phase separation regime has been called the SUPERSTRIPES regime where bubbles of incommensurate lattice, charge and spin ordering coexists with the superconducting phase. The maximum T_c of the HTcS is at the phase boundary of the mesoscopic phase separation. The commensurate normal stripes phase occurs in a region in the 2D space of charge density and misfit strain. The physics of high T_c superconductivity in FeAs multilayers shows a similar 3D phase diagram where the magnetic orthorhombic phase plays the role of commensurate stripes phase and disappears as a function of doping and pressure. The maximum T_c occurs at the phase boundary of the mesoscopic phase separation.