

# Structural and electronic pressure-temperature phase diagram of the new iron based superconductors

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The discovery of superconductivity in the iron based compounds had a great impact on the condensed matter community. The superconducting state evolves from a antiferromagnetically ordered state by doping or by application of an external pressure on the parent compounds. Up to now a lot of effort has been devoted to these materials but there are still a number of unsolved questions concerning the appearance of superconductivity. The study of the crystalline structure, transport properties and electronic structure under pressure is a powerful tool that helps to find clues to analyze the superconducting state. We have studied the effect of structural parameters under pressure on the superconducting properties on compounds belonging to the five representative Fe based families. In particular, we reported the evidence of different structural phase transitions under pressure, for example in the case of FeSe the high pressure phase induce an increase in the superconducting transition temperature ( TC ) with a maximum at 34K. We have also performed high pressure experiments in other compounds from the 111, 122 and 1111 families. The effect on TC of some characteristics parameters under pressure, like the inter(intra)layer distance, the angle Fe-As(Se)-Fe, interstitial ion ordering will be discussed in detail.