BENEMÉRITA UNIVERSIDAD AUTÓNOMA DE PUEBLA

INSTITUTO DE FÍSICA
"Luis Rivera Terrazas"

SEMINARIO

"DR. JESUS REYES CORONA"

"Phonon-mediated high-temperature superconductivity."

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The discovery of superconductivity above 200 K in hydrogen sulfide at high pressure represents a milestone in the search for high-T_c phonon-mediated superconductors [1]. In the first part of my talk, I will briefly review the theory of phonon-mediated superconductivity and discuss strategies to increase the superconducting transition temperature within this pairing scenario. Special attention will be given to the exceptional case of MgB_2. The second part is devoted to the new hydrogen based high-pressure superconductors. Theoretical studies suggested H_3S as the most likely candidate, and predicted the stability of two metallic phases at high pressures, a cubic and a rhombohedral structure [2]. I will present results of a theoretical investigation of the superconducting properties of the two phases and the structural phase transition between them using first principles density functional based techniques. Lattice dynamical calculations indicate that the structural transition is accompanied by a pronounced softening of the phonon spectrum, which leads to maxima in both the electron-phonon coupling strength and T_c at the phase transition.

[1] A. P. Drozdov et al., Nature 525, 73 (2015)
[2] D. Duan et al., Sci. Rep. 4, 6968 (2014)

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