

Colloquium

Department of Physics, Temple University

The Puzzle of Anomalous Isotope Effect in High and Low T_c Superconductors

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Superconductors possess unique properties such as zero electrical resistance and expulsion of magnetic fields below a critical temperature T_c . They can carry electric current without any energy loss and have many applications. However, understanding superconductivity is a great challenge. Especially, anomalously small isotope effect in some high and low T_c superconductors such as $\text{YBa}_2\text{Cu}_3\text{O}_7$ (YBCO), Nb_3Sn , Zr, created a great challenge for understanding. To solve the puzzle, a new methodology is implemented by integrating first-principles calculations of electronic structures of the materials into the theory of many-body physics for superconductivity. The aim is to seek a unified methodology to study the electronic and superconducting properties of the materials. It is demonstrated from first-principles that the extended saddle point singularities in the electronic structures of the materials such as YBCO, Nb_3Sn , Zr, strongly correlate with the anomalous isotope effect in these superconductors. Some guidance for finding new high T_c superconductors will also be discussed.

Monday, September 19, 2016 at 3:00pm

SERC, Room 116

Refreshments served at 2:45pm