Graduate Physics Seminar
12 May 2014 from 14:30
University of Nova Gorica - Ajdovščina Campus
Vipavska 11, Ajdovščina
Amphitheatre

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Superconductivity: The Hottest Low Temperature Phase Transition in the History of Condensed Matter

Abstract

Superconductivity is by far the most studied phase transition of condensed matter. Discovered at the beginning of the 19th century it finally found a satisfactory theoretical description in 1936 with the development of the so called BCS-theory for which John Bardeen, Leon Neil Cooper and John Robert Schrieffer have been awarded with the Nobel Prize in 1972. In 1986, when the hype for superconductivity seemed to have faded, Georg Bednorz and Alex Müller discovered that a particular class of materials that not only were superconductive but also at the record temperature of -238 °C.

The discovery started a real hunt, in search of materials able to superconduct at even higher temperature. What was even more intriguing was the fact that the behavior of these materials was impossible to explain within the framework of BCS. This period was called "a Woodstock of Physics". The two physicists have been granted the Nobel Prize in 1987, only one year after the discovery of "high Tc Superconductivity" (another world record).

In this introductory seminar about superconductivity, the phenomenon will be presented following the timeline set by the discovery, then the basics of the BCS model will be presented to finally move to the High Tc Superconductors and their study through Angular Resolved Photoemission (ARPES). Some real recent data from different experiments will be presented, illustrated, and a brief overview of the state of the art of the materials and studies and open questions will be shown.