Università di Milano-Bicocca

SCUOLA DI DOTTORATO DI SCIENZE

Venerdì 3 aprile 2009 ore 14.30
Aula U2.7, Piazza della Scienza 3

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Superconductivity: at the edge of a centennial jubilee

The lecture is devoted to discussion of one of the most bright and unusual discoveries of XX century Physics: superconductivity. First we discuss the story of discovery of this phenomenon, hopes and delusions followed it, speak about a long half-century of the search for new superconductors and accumulation of the experimental facts. Then we pass to the remarkable phenomenological theory of superconductivity created by Russian physicists Vitaly Ginzburg and Lev Landau. In those times when this theory was developed, the microscopic origin of this quantum phenomenon still could not be recognized, but even being phenomenological in its nature the Ginzburg-Landau theory allowed to systemize and predict a lot of superconductor's properties. Basing on it A.A.Abrikosov discovered soon the fundamentally new class of superconductors: superconductors of the second type. At the end of this part of lecture I will present the basic ideas of the microscopic theory of superconductivity, created in 1957 by three American scientists J.Bardeen, L. Cooper and R.Schriffer. This, first period of studies of superconductivity was superseded by the second one: the period of the chase for high critical temperatures and magnetic fields, proposals of the theoretical concepts for alternative to the BCS mechanisms of superconductivity and development first practical applications. At the same time English physicist Brian Josephson predicted the phenomenon of a weak superconductivity, which opened the new fields of applicability of superconductivity.
The third period in development of superconductivity started in 1986 with the discovery of Swiss scientists Alex Muller and George Bednortz of the new class of oxide superconductors which critical temperatures in short time overcame crucial for practical applications the "nitrogen limit" - 77 K. The author Автор tells about this last, fascinating, period being its immediate participant.

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