

UNIVERSITY OF TEXAS AT DALLAS - DEPARTMENT OF PHYSICS
PHYSICS COLLOQUIUM

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Wednesday, November 7, 2007; 4:00-5:00 PM
Kusch Auditorium, FN 2.102

**“Giant” Strengthening of Superconducting Pairing
in Small Metallic Nanoparticles and Potential for
Room Temperature Superconductivity**

Dr. Vladimir Kresin

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Superconductivity is a peculiar state of matter which is manifested in such diverse fields as solid state physics, nuclear physics, astrophysics, biology, etc. We focus on the theory of small metallic nanoclusters (number of free carriers $N \approx 10^2-10^3$). Delocalized electrons form energy shells similar to those in atoms or nuclei. It turns out that under special, but perfectly realistic conditions the superconducting pairing is very strong, and the nanoclusters form a new family of high temperature superconductors. For realistic sets of parameters one can observe high values of the critical temperature T_c ($T_c \geq 150$ K) as well as a strong modification of the energy spectrum. In principle, it is possible to raise T_c up to room temperature. One can propose specific experiments aimed at detecting the phenomenon (spectroscopy, magnetic and thermodynamic properties). The phenomenon is promising for creation of high T_c superconducting tunneling networks.

* Jointly with Y. Ovchinnikov, *Landau Institute for Theoretical Physics*.

About the speaker: Dr. Vladimir Kresin is a Principal Investigator at the Lawrence Berkeley Laboratory, where he works since 1980. He received his Ph.D. in Physics in Moscow in the former USSR where he belonged to the remarkable school of theoretical physics founded by L.D. Landau. His thesis advisor was E.M. Lifshitz of the famous Landau-Lifshitz Course of Theoretical Physics. Dr. Kresin's major interests are in Superconductivity, Magnetism and Quantum Chemistry (molecular spectroscopy, polyatomic photodissociation, dynamics of chemical reactions). Dr. Kresin published more than 200 papers and authored/edited several books on superconductivity.