

# T<sub>c</sub>SUH Bi-Weekly Seminar

Texas Center for Superconductivity at the University of Houston

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## Fe-As Based High-Temperature Superconductors: The Breakthrough of the Year (2008)

**Friday, April 3, 2009**

Room 102, University of Houston Science Center

12:00 noon – 1:00 p.m.

### Abstract

The discovery of superconductivity in rare earth (R) oxypnictides, R<sub>0</sub>FeAs, by Hosono et al. has revived the field of high-temperature superconductivity. With transition temperatures of up to 55 K the new class of superconducting compounds has given hope to reach even higher T<sub>c</sub>'s exceeding those of the copper oxide superconductors. At the same time, questions have been raised concerning possible similarities and differences between the two high-T<sub>c</sub> systems with the perspective that studying the FeAs superconductors might also help to better understand the cuprates. I will present a brief overview of some recent results and discuss examples of FeAs-based superconductors crystallizing in different basic structure types: (i) The PbFCl-type structure (LiFeAs) and (ii) the ThCr<sub>2</sub>Si<sub>2</sub>-type structure (AFe<sub>2</sub>As<sub>2</sub>, A=K, Rb, Cs, and the solid solution (K/Sr)Fe<sub>2</sub>As<sub>2</sub>). The ternary compounds are all self-doped superconductors. The (K/Sr)Fe<sub>2</sub>As<sub>2</sub> – system reveals an interesting phase diagram that seems to be generic to most FeAs-systems, with a maximum T<sub>c</sub> at an optimal composition and a spin density wave (SDW) state at the Sr-rich side. The extrapolation of the SDW phase boundary suggests the possible existence of a quantum critical point. Evidence for quantum critical scaling is found in resistivity and thermoelectric measurements.

### Bio

Bernd Lorenz received his Ph.D. degree in Physics in 1975 (University of Leipzig, Germany) and his D.Sc. and “Facultas Docendi” in Theoretical Physics in 1991. He worked as a Research Associate at the University of Leipzig (1975-1985), the Institute of High Pressure Research in Potsdam (1985-1990), and as the Head of the High Pressure Physics Group at the University of Potsdam (1990-1996). He spent 15 months at the Colorado State University, Fort Collins, CO as a Visiting Professor in 1993/94. In 1996 Dr. Lorenz joined the Texas Center for Superconductivity at the University of Houston where he is working now as a Research Professor in the High-Pressure Low-Temperature Group. His research interests are in the field of condensed matter physics, including superconductivity, magnetism, ferroelectricity, metal-insulator transitions, etc.

*Persons with disabilities who require special accommodations in attending this lecture should call (713) 743-8210 as soon as possible.*



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