

# The 3<sup>rd</sup> Dvořák Lecture

By Professor Dieter Vollhardt, University of Augsburg, Germany

## Superfluid Helium-3: From very low Temperatures to the Big Bang

June 8, 2011 at 3:00 pm

Institute of Physics of the AS CR, v. v. i., Na Slovance 2, CZ-182 21 Praha 8, Czech Republic

### Annotation

Since their discovery in 1971 the superfluid phases of Helium-3 have proved to be the ideal testing ground for many fundamental concepts of modern physics. Phenomena such as Cooper pairing, macroscopic quantum coherence, spontaneous breaking of high symmetries, and the formation of exotic topological defects are not only an impor-

tant enrichment of the physics of condensed matter, but also provide important links to particle physics, the structure of the early universe and, most recently, quantum turbulence. In my lecture I will present a simple introduction into the physics of superfluid Helium-3, and describe the progress made in this fascinating field of basic research.



### Dieter Vollhardt

Born in 1951, studied physics at the University of Hamburg (graduated 1977, PhD 1979). In the interim he obtained a scholarship for research on He-3 at the University of South California (Los Angeles). After a postdoctoral stay at Max Planck Institute for Physics and Astrophysics at Munich he became a full professor of Physics at RWTH Aachen in 1987. Since 1996 he is the Chair of Theoretical Physics at the

Center for Electronic Correlations and Magnetism of the University of Augsburg. His research activity covers a large scale of problems from superfluid He-3, through charge diffusion and Anderson localization in disordered crystals to strongly correlated electrons and materials science. He is one of the architects of the Dynamical Mean-Field Theory of correlated electrons, which is today one of the most effective tools to calculate electronic properties of transition metals, heavy metals and their alloys. D. Vollhardt is a co-recipient of the 2006 EPS Agilent Technologies Europhysics prize. In 2010 he was awarded the Max-Planck medal of the German Physical Society for his achievements in theoretical physics. D. Vollhardt is an internationally esteemed theoretical physicist, author or co-author of more than 170 research papers and of a book on superfluid He-3 published with P. Wölfle. His work has found broad resonance in the physics community with more than 6000 citations.



### Vladimír Dvořák (1934–2007)

Solid state physicist, the most prominent Czech scientist in the theory of ferroelectricity and structural phase transitions, for the whole productive life affiliated with the Institute of Physics, Acad. Sci. Czech Rep. in Prague, its director in 1993–2001, member of the Learned Society since 1995. The main protagonist of the revolutionary reforms in the Institute of Physics after 1989.

His main achievement was a progress in the theory of improper ferroelectrics and incommensurate phase transitions achieved by a generalization of the group formulation of the Landau theory of phase transitions. For years he would be one of the most cited and internationally renowned scientist of the Institute. His personality has strongly influenced the scientific program and development in the Department of Dielectrics of the Institute since the late sixties up to present. Brilliant lecturer and most respected director of the Institute.

To commemorate his work and personality, the Institute of Physics of the Academy of Sciences of the Czech Republic decided to organize an annual festive Dvořák lecture, given by prominent internationally renowned scientists in the field related to the research pursued at the Institute of Physics.



**Fyzikální ústav**  
Akademie věd ČR, v. v. i.