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EINLADUNG zum IFP-SEMINAR

Thema: **High-pressure effect on the superconductivity of YB_6**

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Termin: **Mittwoch, 26 November 2014, 17 Uhr**

Ort: Institut für Festkörperphysik, TU Wien
Wiedner Hauptstraße 8-10, 1040 Wien
Seminarraum 138B, 7. OG (rote Leitfarbe)

Host: Silke Bühler-Paschen

Förderer: ERC-AdG-227378 QuantumPuzzle

Among the large number of boron-rich binary compounds MB_x (x≥ 6), superconductivity has been found in only eight systems: MB_6 (M = Y, La, Th, Nd) and MB_{12} (*M* = Sc, Y, Zr, Lu). Among these, yttrium hexaboride exhibits the highest transition temperature T_C reaching 8 K. Important issue is to explain significant differences in TC between materials with otherwise very similar electronic and lattice properties. Pressure effects on superconducting properties of two YB_6 samples (T_C = 5.9 and 7.5 K) were investigated by measurements of electrical resistivity, magnetic susceptibility, and x-ray diffraction in the pressure range up to 320 kbar. Magnetoresistivity measurements down to 60 mK and up to 47 kbar have shown a negative pressure effect on T_C as well as on the third critical field H_{C3} with the slopes $d\ln T_C/dp$ = −0.59%/kbar and $d\ln H_{C3}/dp$ = −1.1%/kbar, respectively. The magnetic susceptibility measurements evidenced that the slope of $d\ln T_C/dp$ gradually decreases with pressure reaching a value three times smaller at 112 kbar. The lattice parameter measurements revealed the volume reduction of 14% at 320 kbar. The pressure-volume dependence is described by the Rose-Vinet equation of state. The obtained relative volume dependence $d\ln T_C/d\ln V$ analyzed by the McMillan formula for T_C indicates that the reduction of the superconducting transition temperature is mainly due to hardening of the Einstein-like phonon mode responsible for the superconducting coupling. This is confirmed by the analysis of the resistivity measurements in the normal state up to *T* = 300 K performed at pressures up to 28 kbar.

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