Universal Field-Induced Charge-Density-Wave Phase Diagram: Theory versus Experiments

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We suggest a theory of the Field-Induced Charge-Density-Wave (FICDW) phases, generated by high magnetic fields in quasi-low-dimensional conductors. We demonstrate that, in layered quasi-one-dimensional conductors, the corresponding critical magnetic fields ratios are universal and do not depend on any fitting parameter. In particular, we find that $H_1/H_0 = 0.73$, $H_2/H_0 = 0.59$, $H_3/H_0 = 0.49$, $H_4/H_0 = 0.42$, where H_n is a critical field of a phase transition between the FICDW phases with numbers n and n+1. The suggested theory is in excellent qualitative and quantitative agreements with the existing experimental data in α-$(ET)_2KHg(SCN)_4$ material.

Critical fields	H_1/H_0	H_2/H_0	H_3/H_0	H_4/H_0
Theory	0.73	0.59	0.49	0.42
P= 4 kbar	0.77	0.59	0.40	–
P= 3.5 kbar	0.74	0.57	0.37	–
P= 3 kbar	0.75	0.56	0.40	–

Table I. Theoretical [1] and experimental [2] values of the critical fields ratios for different pressures.

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[1] A.G. Lebed, Phys. Rev. Lett., submitted (2009) [arXiv:0904.2591v1 (2009)].
[2] D. Andres, M.V. Kartsovnik, W. Biberacher et al., arXiv:0801.2696v1 (2008).