05.2-22 SHORT RANGE ORDERING IN $ErRh_4B_4$. By J.L. Hodeau*, M. Cornut* and P. Lejay**, *Laboratoire de Cristallogaphie, **C.R.T.B.T., associés à l'U.S.T.M.G., C.N.R.S., 166 X, 38042 Grenoble Cedex (France).

$ErRh_4B_4$ is a reentrant superconductor and exhibits a superconducting transition at 8.4 K and a ferromagnetic one at 0.9 K ; its structure is Primitive Tetragonal (PT) $P4_2/nmc$, $a_1 = 5.292$ Å, $c_1 = 7.379$ Å). The same compound exists also in another form with a Body Centered Tetragonal cell (BCT) ($I4_1/acd$, $a_2 = 7.461$ Å, $c_2 = 14.804$ Å) ; in this latter structure, the superconducting transition still occurs but the magnetic order is antiferromagnetic [Iwasaki H., Ikebe M. and Muto Y. (1986) Phys. Rev. B 33, 4669-4679 and Iwasaki H. and Muto Y. (1986) Phys. Rev. B33, 4680-4685). These materials can also exist in a third, orthorhombic form ($LuRh_4B_4$ type, $a_3 = 7.444$ Å, $b_3 = 22.30$ Å, $c_3 = 7.465$ Å) which exhibits a superconducting transition at 4.3 K [Yvon K. and Johnston D.C. (1982) Acta Cryst. B 38, 247-250]. $ErRh_4B_4$ PT and BCT form structures were solved by using single crystal X-ray diffraction data [Watanabe Y., Iwasaki H., and Takei H. (1984) Acta Cryst. C40, 1644-1646 and Watanabe Y., Iwasaki H., Iwasaki H. and Muto Y. (1986) Acta Cryst. C42, 1469-1472]. Structural refinements do not reveal any significant disorder in these two structures. Magnetic and superconducting measurements carried out on samples of the BCT form at the C.R.T.B.T. laboratory [Shao L.Q. (1987) Grenoble University Thesis and Genicon J.L., Sulpice A., Tournier R., Chevalier B. and Etourneau J. (1984) J. Physique, Lettres, 44 L725-732] are significantly different from those of Iwasaki H. et al. : a ferromagnetic component appears in the magnetization hysteresis cycle. We have studied by electron diffraction samples which were synthetized by two methods. Our results show that a disordered $ErRh_4B_4$ form exists, the structure of which is closely related to the BCT one.

Single crystals were grown from the melt either in an induction furnace or in a tri-arc furnace under purified argon atmosphere. Samples obtained have a structure related to the BCT, orthorhombic and PT phases, the pseudo cubic sublattice $a \sim 7.45$ Å ($a \sim a_1\sqrt{2} \sim a_2 \sim a_3 \sim c_1 \sim c_2/2 \sim c_3 \sim b_3/3$) is maintained. Superstructure reflections show that this structure is closer to the BCT one. However the observed diffuse streaks indicate that the order of the Rh_4B_4 bitetrahedra is broken along the c axis. The intensity of the diffuse streaks and the modulations of their intensity can change with the sample and the preparation. Many of these compounds are short-range ordered, the corresponding modulation propagation vector length along c is close to 4a.

$ErRh_4B_4$ structures can be schematized as two interpenetrated f.c.c. sublattices of erbium atoms and Rh_4B_4 bitetrahedra. There is only a change of the order and the orientation of the Rh_4B_4 bitetrahedra between the different structural forms. The short range ordered phase we have studied has a structure which can be deduced from the three other ordered phases. The disorder consists of a $\pi/2 \pm \varepsilon$ rotation of Rh_4B_4 bitetrahedra which results in a slight variation of the pseudo cubic lattice parameter and of the Er-Er distances. The disorder and the short range order we have observed could explain the different physical properties measured in our samples and in those of Iwasaki H. et al.

05.2-23 THE CRYSTAL STRUCTURES OF UIr AND UPt AT 300 AND 4 K.

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UIr crystallizes in a monoclinic strongly distorted CrB structure similar to PdBi (or BiPd, to stress the analogy). The distortions do not vary greatly with temperature, not even across the ferromagnetic transition at T_c=46 K. We now detected the same kind of distortions in UPt. In the platinum analog, however, the distortions at room temperature are about twice as strong as in UIr, but decrease on cooling to 4 K (in the ferromagnetic state, T_c=27 K) to roughly the same amount as in UIr.

05.2-24 ANISOTROPY OF THE DIAMAGNETIC SUSCEPTIBILITIES OF DIPHENYL CARBINOL. By S.A. Abdel-Hady, Department of Physics, Faculty of Science, Helwan University, Helwan, Cairo, Egypt.

The diamagnetic susceptibilities of diphenyl carbinol crystals were measured to study the effect of intermolecular hydrogen bonds formed between the carbinol groups of the molecules. The two molecules present in the asymmetric unit are centrosymmetrical. The intermolecular hydrogen bonds are in the form of a chain along the c-axis. The ellipsoid of the diamagnetic susceptibility coincides with the crystallographic axes. The observed high value of the diamagnetic susceptibility along the c-axis is due to the planarity of the benzene rings of the molecules in the c-plane.