At a fluense of $\Phi = 10^{16}$ cm^{-2} observed the reduce of critical fields $H_{c1}^{\|c}$, $H_{c1}^{\|ab}$ and anisotropy parameter γ. In this case, by neutron irradiation the pre-existing defect structure may be weakened significantly. This can explained with the "small doze" effect at the lowest neutron fluence [8]. At the fluence range from 10^{16} cm^{-2} to 10^{17} cm-2, an average values of $H_{c1}^{\|c}$, $H_{c1}^{\|ab}$ and γ practically independent of the neutron fluence.

The enhancement of the neutron fluence over then 10^{17} cm^{-2} leads to increase the critical fields in results introduction of the high concentration "strong" pinning centers. The non-monotonous effect of neutron irradiation on critical fields of BSCCO-crystals connected with an interaction between the pre-irradiation defect structure and the neutron induced defect cascades, that mark in [9]. In this case, the anisotropy parameter remains almost constant so long as the introduction defects apparently distribution of the isotropy, and, consequently, do not influence on degree of the anisotropy.

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PECULIARITIES OF Cu MAGNETIC SYSTEM BEHAVIOR IN MODERATELY OXYGENATED La_2CuO_{4+x} SINGLE CRYSTALS AT PHASE SEPARATION

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As now well established, moderately doped crystals of La_2CuO_{4+x} ($0.01 \leq x \leq 0.055$) phase separate into the oxygen-poor ($x \approx 0.01$) near to stoichiometric regions and the oxygen-rich ($x \approx 0.055$) domains of a conducting (superconducting below $T_c \leq 40$ K) subphase [1].

We shortly report here the results of study of Cu magnetic system behavior in three single crystals of La_2CuO_{4+x} at phase separation (PS), that starts at some temperature T_{ps}. In these crystals the excess-oxygen content x corresponded to three different physical situations for the PS: a) PS starts befor magnetic ordering ($T_{ps} > T_N \approx 222$ K); b) PS starts simultaneously with magnetic ordering ($T_{ps} \approx T_N \approx 243$ K); c) PS starts after magnetic ordering ($T_{ps} < T_N \approx 272$ K). To characterize x-value and T_{ps} in the samples the data on their correlation with Neel temperature T_N were used [2].

For investigation of dynamic magnetic properties of La_2CuO_{4+x} compounds, the technique has been used of nonlinear longitudinal response (NLR) in a sample under study to

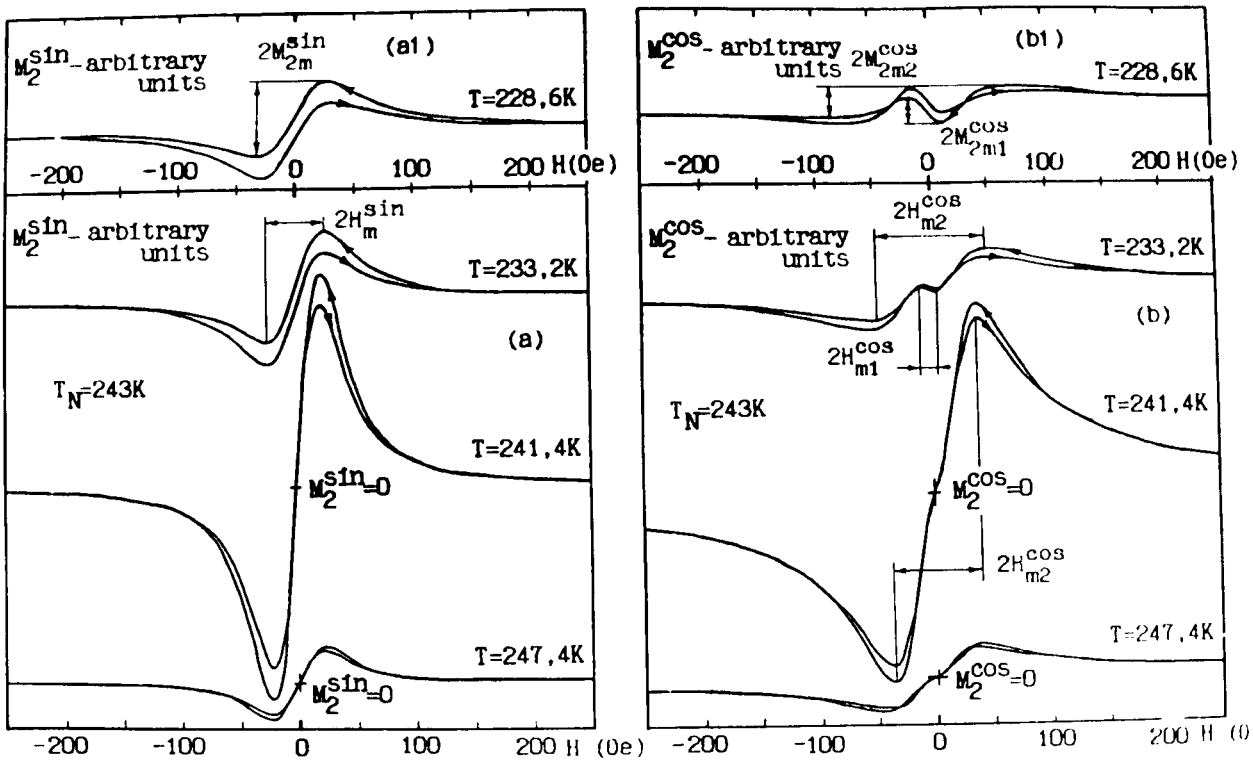

Fig. The $ReM_2 = M_2^{cos}$ and $ImM_2 = M_2^{sin}$ sigmals for sample with $T_N = 243$ K $\sim T_{ps}$ at some temperatures close to T_N. H is perpendicular to CuO_2-planes. For $(a1)$ and $(b1)$ panels, the scale is greater (2.5:1) in comparison with (a), (b) panels

parallel static H and AC harmonic magnetic fields ($f = \omega/2\pi \approx 16$ MHz, $h \approx 40$ Oe) [3]. Phase components of the second harmonic of magnetization ReM_2 and ImM_2 were recorded as functions of H at different temperatures of the samples under condition $M_2 \sim h^2$. Fig. shows some out-of-plane (H is perpendicular to CuO_2-planes of La_2CuO_{4+x} signals near T_N in sample with $T_N \approx 243$ K. Similar signals were observed for two other samples. We characterize such experimental curves by amplitudes in the extremum points and by H-positions of these extrema in static field (Fig.1). The temperature dependence of these parameters has been obtained from experimental curves. The most important peculiarities of the experimental data are as follows [4,5]:

I. Common features for all the samples:

1) The signals are observed in the PS temperature region.
2) The response is strongly anisotropic, with out-of-plane signals being observable only.
3) A field hysteresis is observed in the signals below T_N.
4) All the extrema in both M_2-phase components are observed at extremely weak static field H about several tens Oe.

II. Additional peculiarities of response for the samples with $T_{ps} \geq T_N$ (PS starts befor or simultaneously with magnetic ordering):

1) The amplitudes of signal extrema exhibit a strong temperature dependence in both ReM_2 and ImM_2 and ImM_2 with maximum at $T \approx T_N$ (critical enhancement) and with signal shape being unchangable.
2) The positions of signal extrema in static field H and ratio of ReM_2/ImM_2 in extrema are independent on temperature near T_N.

The signals were well reproducel in all the experiments.

In crystals with $T_{ps} \geq T_N$ the oxygen-poor regions ($x \approx 0.01$) are respondible for the critical NLR since only this phase exhibits magnetic ordering. As it was shown in [4,5] the NLR of this crystals can be due to formation of the 3D domains, which possess a weak ferromagnetism, at the PS. It means an appearence of new magnetic properties in the course of PS. A typical domain is assumed to be a 3D stoichiometric fragment of La_2CuO_{4+x} in which rare inclusions of O-rich planar regions are alternated along out-of-plane direction. The simplest model of such a fragmentation is system of the periodically arranged elementary domains containing N "pure" CuO_2-planes and one O-rich plane. Due to the inequivalence of the O-rich and "pure" planes, the sum (L) of antiferromagnetism vectors of the planes that belongs to the elementary domain becomes a critical quantity. The Dzyaloshinskii-Moriya interaction connects the in-plane fluctuations of L and the out-of-plane ones of a magnetization M that leads to a nonlinear, critical, anisotropic dependence of M on H and to critical anisotropic NLR.

The estimation of domain sizes was obtained: about 4.5×10^3 A in CuO_2-plane and *not* less than 260 A in orthogonal direction.

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MEAN-SQUARE DISPLACEMENTS AND CHARACTERISTIC FREQUENCIES OF THE THERMAL VIBRATIONS OF RARE-EARTH IONS IN THE HEXABORIDES REB_6(RE=La→Sm)

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The rare-earth (RE) hexaborides exhibit a large variety of unusual physical properties. Depending on the rare-earth element, these borides can be described as Kondo systems (CeB_6), exhibit valence fluctuations (SmB_6), or can be metallic (PrB_6, NdB_6), or superconductors (LaB_6).