SPIN CORRELATIONS IN MnO

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Many experimental works have been done in order to explain the mechanism of the phase transition in MnO1-8). In the recent experiments made by Bloch et al.6,7) it was established the presence of the first order transition. Their neutron diffraction measurements, made under the pressure, show that the transition remains discontinuous until the stress is less than critical. Above the critical value of the pressure, the character of the transition is changed and becomes continuous.

Using simple powder neutron diffraction method (λ=0,937 Å; full width at half-maximum 38'; temperature gradient less than 0,3°) we have obtained the diffraction patterns in temperature interval 100-700 K (fig.1) It can be seen from the figure pronounced temperature changes of the liquid type neutron scattering which was explained by Shull as the short-range magnetic order. This kind of ordering exists below and above the Néel temperature and retains even on 700 K (fig.1). The temperature dependence of the diffuse neutron scattering shows slow change below and above the Néel point. In the vicinity of the critical point, the shape of the integrated diffuse intensity reminds very much of the critical neutron scattering5) (fig.2)

In these measurements we didn't observe anomal behaviour of the nuclear reflection (222) in the vicinity of the transition point which was evident during the first temperature treatment8). Such structural changes could be explained by thermal hysteresis effect.

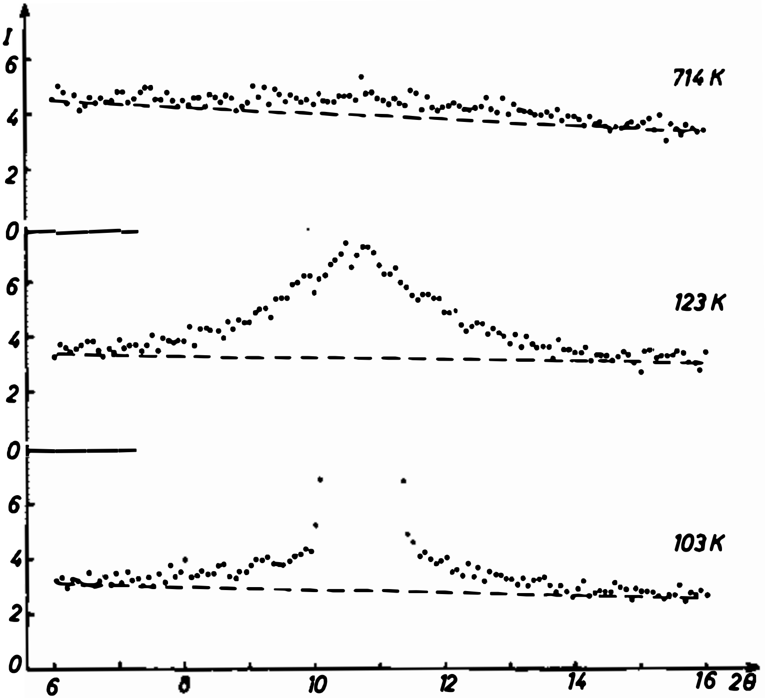
I
6
4
2
0
714 K
6
4
2
0
123 K
6
4
2
0
103 K
6
8
10
12
14
16
2θ

fig. 1.

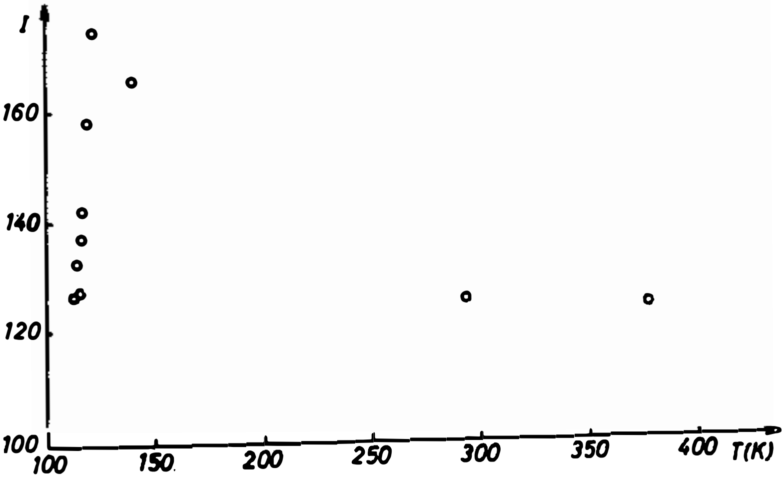
I
160
140
120
100
100
150
200
250
300
350
400
T(K)

fig. 2.

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