Reply to "Comment on 'Frustration effects in the disordered system $CsMnFeF_6$, studied by neutron scattering, ac susceptibility, and magnetization measurements' "

M. Steiner
Hahn-Meitner-Institut, Glienicker Strasse 100, D-1000 Berlin 39, Federal Republic of Germany
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In the preceding Comment the neutron diffraction results presented in a paper [L. Bevaart, P. M. H. L. Tegelaar, A. J. van Duyneveldt, and M. Steiner, Phys. Rev. B **26**, 6150 (1982)] which differed from earlier results by W. Kurtz are questioned. In the following these points are discussed.

In the preceding Comment[1] Kurtz argues that the differences between our results[2] and his results might be due to different sample preparation and history. We fully agree that this is a problem for this class of substances. However, without very detailed structural studies, nobody can claim who has the right sample, ourselves or Kurtz. We have started in our laboratory studies on the structural problems of these systems.[3]

Kurtz claims that the contribution to the Bragg peaks found is not reliable, and that the temperature dependence shown in Fig. 4 of Ref. 2 is much too large. We feel that the procedure used to obtain these changes is correct, and, as can be seen from Fig. 3 of Ref. 2, reliable. Our results do agree with all other evidence for a sort of transition around 28 K. The only explanation is the sample problem as discussed above. We could not check these results with single crystals, due to severe extinction problems.[4]

Kurtz claims that we "found the diffuse scattering, which peaks near the (111) reflection, to vanish in the forward direction."

First, Kurtz cites correctly that we have been making statements in this context about the *diffuse* scattering *only*, i.e., the scattering which varies slowly with scattering angle. This *diffuse* scattering is *one* part of the total scattering, which contains instrumental background, incoherent background, and Bragg scattering as well. We have not presented data on, nor made any statement about the *total* scattered intensity at low angles, while Kurtz is arguing against zero *total* scattered intensity in the forward direction. Therefore, I shall not further discuss his arguments about improper measurement procedure on our side. An impression of the quality and reliability of our measurements can be gained from Fig. 3 of Ref. 2.

Second, Kurtz cites us incorrectly, when he writes "to vanish in the *forward direction.*" Such a general statement was not and could not be made on the basis of our results, limited to scattering angles larger than 5°.

The real and essential point to discuss is that we did not reproduce the result obtained by Kurtz in his earlier experiments, namely, the upward turn of the diffuse scattering for $2\theta \leq 9°$ (in the units used in Fig. 2 of Ref. 2). Our further single-crystal experiments did not reveal such a minimum either.[4]

Again, it could be the different samples have slightly different next-nearest-neighbor interactions. Since all experimental evidence, susceptibility, and polarized neutron scattering[4] point to some type of ferromagnetic transition around 28 K, one would expect magnetic diffuse scattering in the "forward direction" ($2\theta \simeq 0$). Depending on the "correlation length" of this "ferromagnetic" behavior, the corresponding neutron scattering intensity extends over a certain 2θ range around $2\theta \simeq 0$. Thus, this question can only be answered by further experiments, in particular by small-angle scattering.

In summary, the difference between the results of Kurtz and our results are to be considered real, the reason for this being not clear at present. However, it could be due to the differences in sample preparation and/or sample history. Only further experiments on the structural as well as the magnetic properties can clarify the reasons for the different results discussed here.

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[1]W. Kurtz, Phys. Rev. B **32**, 4778 (1985).
[2]L. Bevaart, P. M. H. L. Tegelaar, A. J. van Duyneveldt, and M. Steiner, Phys. Rev. B **26**, 6150 (1982).
[3]S. Kraśnicki, M. Steiner, H. Dachs, and B. Wanklyn, Hahn-Meitner Institute Report No. HMI-B370, 1982 (unpublished), p. 92.
[4]M. Steiner, S. Kraśnicki, H. Dachs, and R. V. Wallpach, J. Phys. Soc. Jpn., Suppl. **52**, 173 (1983).