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Corrigendum to the Note "Time inversion in the representation analysis of magnetic structures" [C. R. Physique 6 (2005) 375–384]

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In the article [1], the magnetic little group $G_{\mathbf{k}}^{\Theta}$ of the **k** vector was introduced. It was correctly stated that the operators of $G_{\mathbf{k}}^{\Theta}$ act on a space whose dimension (or number of basis vectors) is twice as large than for the ordinary little group $G_{\mathbf{k}}$. Unfortunately, it was incorrectly stated that when the magnetic corepresentation and the irreducible corepresentations are real, one can choose real basis vectors and this remove the factor two. As a matter of fact, this reduction is not possible. However, the method proposed in [1] can be used, but the results, in the case of a 'black and white' group, may be different.

In the example of $CeAl_2$ treated in [1], the transformation operators of $G_{\mathbf{k}}^{\Theta}$ act on $\mathbf{m}_{j\alpha}^{\mathbf{k}}$ and $\mathbf{m}_{j\alpha}^{-\mathbf{k}}$, i.e., on 12 components. The corresponding corepresentation $c\Gamma$ is therefore of dimension 12. Table 8 of [1] has to be corrected as follows:

(i) The caption should be "action of the operators of $G_{\mathbf{k}}^{\Theta}$ on the components $\mathbf{m}_{j\alpha}^{\mathbf{k}}$ and $(\mathbf{m}_{j\alpha}^{\mathbf{k}})^*$ of $CeAl_2$";
(ii) in the last two columns, the components $\mathbf{m}_{j\alpha}^{\mathbf{k}}$ should be replaced by $(\mathbf{m}_{j\alpha}^{\mathbf{k}})^*$;
(iii) 6 additional lines should be inserted, which describe the action of the 4 operators on the 6 components $(\mathbf{m}_{j\alpha}^{\mathbf{k}})^*$;
(iv) in the last line the character χ is 12 for h_1 (instead of 6) and 0 for the other 3 operators.

The decomposition of the corepresentation is

$$c\Gamma = 3c\tau_1^+ + 3c\tau_1^- + 3c\tau_2^+ + 3c\tau_2^-$$

The basis vectors for each irreducible corepresentation $c\tau_\nu^\pm$ are:

$$\mathbf{m}_{\nu\pm}^{\mathbf{k1}} = \left(\mathbf{m}_{\mathbf{1x}}^{\mathbf{k}} + \varepsilon'\mathbf{m}_{\mathbf{2y}}^{\mathbf{k}}\right) + \varepsilon\left(\mathbf{m}_{\mathbf{1y}}^{\mathbf{k}} + \varepsilon'\mathbf{m}_{\mathbf{2x}}^{\mathbf{k}}\right)^*; \quad \mathbf{m}_{\nu\pm}^{\mathbf{k2}} = \varepsilon\left(\mathbf{m}_{\nu\pm}^{\mathbf{k1}}\right)^*; \quad \mathbf{m}_{\nu\pm}^{\mathbf{k3}} = \left(\mathbf{m}_{\mathbf{1z}}^{\mathbf{k}} + \varepsilon'\mathbf{m}_{\mathbf{2z}}^{\mathbf{k}}\right) + \varepsilon\left(\mathbf{m}_{\mathbf{1z}}^{\mathbf{k}} + \varepsilon'\mathbf{m}_{\mathbf{2z}}^{\mathbf{k}}\right)^*$$

where $\varepsilon = +1$ for $c\tau_\nu^+$, $\varepsilon = -1$ for $c\tau_\nu^-$ and where $\varepsilon' = -1$ for $c\tau_1^\pm$ and $\varepsilon' = +1$ for $c\tau_2^\pm$. Contrarily to what was written in [1], corepresentations $c\tau_1^+$ and $c\tau_1^-$ are equivalent (as well as $c\tau_2^+$ and $c\tau_2^-$).

The magnetic structure, as deduced from the experiment, corresponds to corepresentation $c\tau_1^+$. It is defined by:

$$m_{2x}^k = -m_{1y}^k; \qquad m_{2y}^k = -m_{1x}^k; \qquad m_{2z}^k = -m_{1z}^k$$

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in agreement with [1]. However, the additional condition [1] $m_{1x}^{\mathbf{k}} = m_{1y}^{\mathbf{k}}$ is wrong and should be replaced by

$$m_{1x}^{k} = \varepsilon\left(m_{1y}^{k}\right)^{*}$$

Concerning $CeAl_2$, this replacement is the essential point of this appendix.

More details will be presented elsewhere [2].

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References

[1] J. Schweizer, C. R. Physique 6 (2005) 375–384.
[2] J. Schweizer, J. Villain, A.B. Harris, in preparation.