Tables of Opechowski's magic relations

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Tensors of material physics are characterized by their intrinsic symmetry and by parities with respect to the space inversion i, magnetic inversion e' and combined inversion i'. If a suitable system of irreducible representations is chosen, then the decomposition of tensors into tensorial covariants for tensors of the same intrinsic symmetry but different parities can be easily deduced for all magnetic groups of a given oriented Laue class from the decomposition of a tensor with positive parities into covariants of the group of proper rotations which generates this oriented Laue class. The relations between tensor decompositions are called Opechowski's magic relations in homage of late professor Opechowski. Their history and derivation of respective rules are given in a recent paper by Kopský (2006), where tables of these relations are given for oriented Laue classes C_3, D_3, C_4, and D_4. In this deposition are given tables of Opechowski's magic relations for all oriented Laue classes including noncrystallographic and infinite magnetic point groups.

Acknowledgements

This work is part of a project AVOZ 10100520 of the Czech Academy and has been supported by grant No. 202/04/0992 of the Czech Grant Agency. The support of the Technical university of Liberec is also highly appreciated.

Reference:

Kopský, V. (2006). *Z. Kristallogr.* **221**, 51-62.

Laue class C_1

Group of proper rotations $C_1 - 1$							
		Ireps associated with inversions			Transformation properties of nontrivial scalars		
Class	Group	i	e'	i'	ε	τ	$\varepsilon\tau$
C_1	1	χ_1	χ_1	χ_1	x_1	x_1	x_1
Centrosymmetric point group $C_i - \overline{1}$ **and its isomorphic nonparamagnetic group**							
C_i	$\overline{1}$	χ_1^-	χ_1^+	χ_1^-	x_1^-	x_1^+	x_1^-
$C_i(C_1)$	$\overline{1}'$	χ_1^-	χ_1^-	χ_1^+	x_1^-	x_1^-	x_1^+
Noncentrosymmetric paramagnetic group isomorphic with centrosymmetric group $C_i - \overline{1}$							
C_1'	$1'$	χ_{1e}	χ_{1m}	χ_{1m}	x_{1e}	x_{1m}	x_{1m}
Centrosymmetric paramagnetic group $C_i' - \overline{1}.1'$							
C_i'	$\overline{1}.1'$	χ_{1e}^-	χ_{1m}^+	χ_{1m}^-	x_{1e}^-	x_{1m}^+	x_{1m}^-

Laue class C_2

Magnetic point groups, isomorphic with proper rotation group $C_2 \ - \ 2_z$							
		Ireps associated with inversions			Transformation properties of nontrivial scalars		
Class	Group	i	e'	i'	ε	τ	$\varepsilon\tau$
C_2	2_z	χ_1	χ_1	χ_1	x_1	x_1	x_1
$C_2(C_1)$	$2'_z$	χ_1	χ_3	χ_3	x_1	x_3	x_3
C_s	m_z	χ_3	χ_1	χ_3	x_3	x_1	x_3
$C_s(C_1)$	m'_z	χ_3	χ_3	χ_1	x_3	x_3	x_1
Nonparamagnetic point groups isomorphic with centrosymmetric group $C_{2h} \ - \ 2_z/m_z$							
C_{2h}	$2_z/m_z$	χ_1^-	χ_1^+	χ_1^-	x_1^-	x_1^+	x_1^-
$C_{2h}(C_s)$	$2'_z/m_z$	χ_1^-	χ_3^+	χ_3^-	x_1^-	x_3^+	x_3^-
$C_{2h}(C_2)$	$2_z/m'_z$	χ_1^-	χ_1^-	χ_1^+	x_1^-	x_1^-	x_1^+
$C_{2h}(C_i)$	$2'_z/m'_z$	χ_1^-	χ_3^-	χ_3^+	x_1^-	x_3^-	x_3^+
Noncentrosymmetric paramagnetic groups isomorphic with centrosymmetric group $C_{2h} \ - \ 2_z/m_z$							
C'_2	$2_z.1'$	χ_{1e}	χ_{1m}	χ_{1m}	x_{1e}	x_{1m}	x_{1m}
C'_s	$m_z.1'$	χ_{2e}	χ_{1m}	χ_{2m}	x_{2e}	x_{1m}	x_{2m}
Centrosymmetric paramagnetic group $C'_{2h} \ - \ 2_z/m_z.1'$							
C'_{2h}	$2_z/m_z.1'$	χ_{1e}^-	χ_{1m}^+	χ_{1m}^-	x_{1e}^-	x_{1m}^+	x_{1m}^-

Laue class D_2

Magnetic point groups, isomorphic with proper rotation group $D_2 \ - \ 2_x2_y2_z$							
		Ireps associated with inversions			Transformation properties of nontrivial scalars		
Class	Group	i	e'	i'	ε	τ	$\varepsilon\tau$
D_2	$2_z2_y2_z$	χ_1	χ_1	χ_1	x_1	x_1	x_1
$D_2(C_{2z})$	$2'_x2'_y2_z$	χ_1	χ_2	χ_2	x_1	x_2	x_2
$D_2(C_{2x})$	$2_x2'_y2'_z$	χ_1	χ_3	χ_3	x_1	x_3	x_3
$D_2(C_{2y})$	$2'_x2_y2'_z$	χ_1	χ_4	χ_4	x_1	x_4	x_4
C_{2vz}	$m_xm_y2_z$	χ_2	χ_1	χ_2	x_2	x_1	x_2
$C_{vz}(C_{2z})$	$m'_xm'_y2_z$	χ_2	χ_2	χ_1	x_2	x_2	x_1
$C_{2vz}(C_{sx})$	$m_xm'_y2'_z$	χ_2	χ_3	χ_4	x_2	x_3	x_4
$C_{2vz}(C_{sy})$	$m'_xm_y2'_z$	χ_2	χ_4	χ_3	x_2	x_4	x_3
C_{2vx}	$2_xm_ym_z$	χ_3	χ_1	χ_3	x_3	x_1	x_3
$C_{2vx}(C_{sz})$	$2'_xm'_ym_z$	χ_3	χ_2	χ_4	x_3	x_2	x_4
$C_{2vx}(C_{2x})$	$2_xm'_{xy}m_z$	χ_3	χ_3	χ_1	x_3	x_3	x_1
$C_{2vx}(C_{sy})$	$2'_xm_ym'_z$	χ_3	χ_4	χ_2	x_3	x_4	x_2
C_{2vy}	$m_x2_ym_z$	χ_4	χ_1	χ_4	x_4	x_1	x_4
$C_{2vy}(C_{sz})$	$m'_x2'_ym_z$	χ_4	χ_2	χ_3	x_4	x_2	x_3
$C_{2vy}(C_{sx})$	$m_x2'_ym'_z$	χ_4	χ_3	χ_2	x_4	x_3	x_2
$C_{2vy}(C_{2y})$	$m'_x2_ym'_z$	χ_4	χ_4	χ_1	x_4	x_4	x_1

Laue class D_2 - (cont.)

Nonparamagnetic point groups isomorphic with centrosymetric group $D_{2h}\ -\ m_x m_y m_z$							
		Ireps associated with inversions			Transformation properties of nontrivial scalars		
Class	Group	i	e'	i'	ε	τ	$\varepsilon\tau$
D_{2h}	$m_x m_y m_z$	χ_1^-	χ_1^+	χ_1^-	x_1^-	x_1^+	x_1^-
$D_{2h}(C_{2hz})$	$m'_x m'_y m_z$	χ_1^-	χ_2^+	χ_2^-	x_1^-	x_2^+	x_2^-
$D_{2h}(C_{2hx})$	$m_x m'_y m'_z$	χ_1^-	χ_3^+	χ_3^-	x_1^-	x_3^+	x_3^-
$D_{2h}(C_{2hy})$	$m'_x m_y m'_z$	χ_1^-	χ_4^+	χ_4^-	x_1^-	x_4^+	x_4^-
$D_{2h}(D_2)$	$m'_x m'_y m'_z$	χ_1^-	χ_1^-	χ_1^+	x_1^-	x_1^-	x_1^+
$D_{2h}(C_{2vz})$	$m_x m_y m'_z$	χ_1^-	χ_2^-	χ_2^+	x_1^-	x_2^-	x_2^+
$D_{2h}(C_{2vx})$	$m'_x m_y m_z$	χ_1^-	χ_3^-	χ_3^+	x_1^-	x_3^-	x_3^+
$D_{2h}(C_{2vy})$	$m_z m'_y m_z$	χ_1^-	χ_4^-	χ_4^+	x_1^-	x_4^-	x_4^+
Noncentrosymmetric paramagnetic groups isomorphic with centrosymetric group $D_{2h}\ -\ m_x m_y m_z$							
D'_2	$2_x 2_y 2_z.1'$	χ_{1e}	χ_{1m}	χ_{1m}	x_{1e}	x_{1m}	x_{1m}
C'_{2vz}	$m_x m_y 2_z.1'$	χ_{2e}	χ_{1m}	χ_{2m}	x_{2e}	x_{1m}	x_{2m}
C'_{2vx}	$2_x m_y m_z.1'$	χ_{3e}	χ_{1m}	χ_{3m}	x_{3e}	x_{1m}	x_{3m}
C'_{2vy}	$m_x 2_y m_z.1'$	χ_{4e}	χ_{1m}	χ_{4m}	x_{4e}	x_{1m}	x_{4m}
Centrosymmetric paramagnetic group $D'_{2h}\ -\ m_x m_y m_z.1'$							
D'_{2h}	$m_x m_y m_z.1'$	χ_{1e}^-	χ_{1m}^+	χ_{1m}^-	x_{1e}^-	x_{1m}^+	x_{1m}^-

Laue class C_4

Class	Group	Ireps associated with inversions i	e'	i'	Transformation properties of nontrivial scalars ε	τ	$\varepsilon\tau$
Magnetic point groups, isomorphic with proper rotation group $C_4 - 4_z$							
C_4	4_z	χ_1	χ_1	χ_1	x_1	x_1	x_1
$C_4(C_2)$	$4'_z$	χ_1	χ_3	χ_3	x_1	x_3	x_3
S_4	$\overline{4}_z$	χ_3	χ_1	χ_3	x_3	x_1	x_3
$S_4(C_2)$	$\overline{4}'_z$	χ_3	χ_3	χ_1	x_3	x_3	x_1
Nonparamagnetic point groups isomorphic with centrosymmetric group $C_{4h} - 4_z/m_z$							
C_{4h}	$4_z/m_z$	χ_1^-	χ_1^+	χ_1^-	x_1^-	x_1^+	x_1^-
$C_{4h}(C_{2h})$	$4'_z/m_z$	χ_1^-	χ_3^+	χ_3^-	x_1^-	x_3^+	x_3^-
$C_{4h}(C_4)$	$4_z/m'_z$	χ_1^-	χ_1^-	χ_1^+	x_1^-	x_1^-	x_1^+
$C_{4h}(S_4)$	$4'_z/m'_z$	χ_1^-	χ_3^-	χ_3^+	x_1^-	x_3^-	x_3^+
Noncentrosymmetric paramagnetic groups isomorphic with centrosymmetric group $C_{4h} - 4_z/m_z$							
C'_4	$4_z.1'$	χ_{1e}	χ_{1m}	χ_{1m}	x_{1e}	x_{1m}	x_{1m}
S'_4	$\overline{4}_z.1'$	χ_{2e}	χ_{1m}	χ_{2m}	x_{2e}	x_{1m}	x_{2m}
Centrosymmetric paramagnetic group $C'_{4h} - 4_z/m_z.1'$							
C'_{4h}	$4_z/m_z.1'$	χ_{1e}^-	χ_{1m}^+	χ_{1m}^-	x_{1e}^-	x_{1m}^+	x_{1m}^-

Laue class D_4

Magnetic point groups, isomorphic with proper rotation group $D_4 \ - \ 4_z 2_x 2_{xy}$							
		Ireps associated with inversions			Transformation properties of nontrivial scalars		
Class	Group	i	e'	i'	ε	τ	$\varepsilon\tau$
D_4	$4_z 2_x 2_{xy}$	χ_1	χ_1	χ_1	x_1	x_1	x_1
$D_4(C_4)$	$4_z 2'_x 2'_{xy}$	χ_1	χ_2	χ_2	x_1	x_2	x_2
$D_4(D_2)$	$4'_z 2_x 2'_{xy}$	χ_1	χ_3	χ_3	x_1	x_3	x_3
$D_4(\widehat{D}_2)$	$4'_z 2'_x 2_{xy}$	χ_1	χ_4	χ_4	x_1	x_4	x_4
C_{4v}	$4_z m_x m_{xy}$	χ_2	χ_1	χ_2	x_2	x_1	x_2
$C_{4v}(C_4)$	$4_z m'_x m'_{xy}$	χ_2	χ_2	χ_1	x_2	x_2	x_1
$C_{4v}(C_{2v})$	$4'_z m_x m'_{xy}$	χ_2	χ_3	χ_4	x_2	x_3	x_4
$C_{4v}(\widehat{C}_{2v})$	$4'_z m'_x m_{xy}$	χ_2	χ_4	χ_3	x_2	x_4	x_3
D_{2d}	$\overline{4}_z 2_x m_{xy}$	χ_3	χ_1	χ_3	x_3	x_1	x_3
$D_{2d}(S_4)$	$\overline{4}_z 2'_x m'_{xy}$	χ_3	χ_2	χ_4	x_3	x_2	x_4
$D_{2d}(D_2)$	$\overline{4}'_z 2_x m'_{xy}$	χ_3	χ_3	χ_1	x_3	x_3	x_1
$D_{2d}(\widehat{C}_{2v})$	$\overline{4}'_z 2'_x m_{xy}$	χ_3	χ_4	χ_2	x_3	x_4	x_2
$\widehat{D}_{2d}$	$\overline{4}_z m_x 2_{xy}$	χ_4	χ_1	χ_4	x_4	x_1	x_4
$\widehat{D}_{2d}(S_4)$	$\overline{4}_z m'_x 2'_{xy}$	χ_4	χ_2	χ_3	x_4	x_2	x_3
$\widehat{D}_{2d}(C_{2v})$	$\overline{4}'_z m_x 2'_{xy}$	χ_4	χ_3	χ_2	x_4	x_3	x_2
$\widehat{D}_{2d}(\widehat{D}_2)$	$\overline{4}'_z m'_x 2_{xy}$	χ_4	χ_4	χ_1	x_4	x_4	x_1

Laue class D_4 - (cont.)

Nonparamagnetic point groups isomorphic with centrosymetric group $D_{4h} - 4_z/m_z m_x m_{xy}$							
		Ireps associated with inversions			Transformation properties of nontrivial scalars		
Class	Group	i	e'	i'	ε	τ	$\varepsilon\tau$
D_{4h}	$4_z/m_z m_x m_{xy}$	χ_1^-	χ_1^+	χ_1^-	x_1^-	x_1^+	x_1^-
$D_{4h}(C_{4h})$	$4_z/m_z m'_x m'_{xy}$	χ_1^-	χ_2^+	χ_2^-	x_1^-	x_2^+	x_2^-
$D_{4h}(D_{2h})$	$4'_z/m_z m_x m'_{xy}$	χ_1^-	χ_3^+	χ_3^-	x_1^-	x_3^+	x_3^-
$D_{4h}(\widehat{D}_{2h})$	$4'_z/m_z m'_x m_{xy}$	χ_1^-	χ_4^+	χ_4^-	x_1^-	x_4^+	x_4^-
$D_{4h}(D_4)$	$4_z/m'_z m'_x m'_{xy}$	χ_1^-	χ_1^-	χ_1^+	x_1^-	x_1^-	x_1^+
$D_{4h}(C_{4v})$	$4_z/m'_z m_x m_{xy}$	χ_1^-	χ_2^-	χ_2^+	x_1^-	x_2^-	x_2^+
$D_{4h}(D_{2d})$	$4'_z/m'_z m'_x m_{xy}$	χ_1^-	χ_3^-	χ_3^+	x_1^-	x_3^-	x_3^+
$D_{4h}(\widehat{D}_{2d})$	$4'_z/m'_z m_x m'_{xy}$	χ_1^-	χ_4^-	χ_4^+	x_1^-	x_4^-	x_4^+
Noncentrosymmetric paramagnetic groups isomorphic with centrosymetric group $D_{4h} - 4_z/m_z m_x m_{xy}$							
D'_4	$4_z 2_x 2_{xy}.1'$	χ_{1e}	χ_{1m}	χ_{1m}	x_{1e}	x_{1m}	x_{1m}
C'_{4v}	$4_z m_x m_{xy}.1'$	χ_{2e}	χ_{1m}	χ_{2m}	x_{2e}	x_{1m}	x_{2m}
D'_{2d}	$\overline{4}_z 2_x m_{xy}.1'$	χ_{3e}	χ_{1m}	χ_{3m}	x_{3e}	x_{1m}	x_{3m}
$\widehat{D}'_{2d}$	$\overline{4}_z m_x 2_{xy}.1'$	χ_{4e}	χ_{1m}	χ_{4m}	x_{4e}	x_{1m}	x_{4m}
Centrosymmetric paramagnetic group $D'_{4h} - 4_z/m_z m_x m_{xy}.1'$							
D'_{4h}	$4_z/m_z m_x m_{xy}.1'$	χ_{1e}^-	χ_{1m}^+	χ_{1m}^-	x_{1e}^-	x_{1m}^+	x_{1m}^-

Laue class C_3

Group of proper rotations C_3 – 3_z							
		Ireps associated with inversions			Transformation properties of nontrivial scalars		
Class	Group	i	e'	i'	ε	τ	$\varepsilon\tau$
C_3	3_z	χ_1	χ_1	χ_1	x_1	x_1	x_1
Centrosymmetric point group $C_{3i} - \overline{3}_z$ and its isomorphic nonparamagnetic group							
C_{3i}	$\overline{3}_z$	χ_1^-	χ_1^+	χ_1^-	x_1^-	x_1^+	x_1^-
$C_{3i}(C_3)$	$\overline{3}'_z$	χ_1^-	χ_1^-	χ_1^+	x_1^-	x_1^-	x_1^+
Noncentrosymmetric paramagnetic group isomorphic with centrosymmetric group $C_{3i} - \overline{3}_z$							
C'_3	$3_z.1'$	χ_{1e}	χ_{1m}	χ_{1m}	x_{1e}	x_{1m}	x_{1m}
Centrosymmetric paramagnetic group C'_{3i} – $\overline{3}_z.1'$							
C'_{3i}	$\overline{3}_z.1'$	χ_{1e}^-	χ_{1m}^+	χ_{1m}^-	x_{1e}^-	x_{1m}^+	x_{1m}^-

Laue class D_3

Class	Group	Ireps associated with inversions i	e'	i'	Transformation properties of nontrivial scalars ε	τ	$\varepsilon\tau$
Magnetic point groups, isomorphic with proper rotation group $D_{3x} - 3_z2_x$							
D_{3x}	3_z2_x	χ_1	χ_1	χ_1	x_1	x_1	x_1
$D_{3x}(C_3)$	$3_z2'_x$	χ_1	χ_2	χ_2	x_1	x_2	x_2
C_{3vx}	3_zm_x	χ_2	χ_1	χ_2	x_2	x_1	x_2
$C_{3vx}(C_3)$	$3_zm'_x$	χ_2	χ_2	χ_1	x_2	x_2	x_1
Nonparamagnetic point groups isomorphic with centrosymmetric group $D_{3dx} - \overline{3}_zm_x$							
D_{3dx}	$\overline{3}_zm_x$	χ_1^-	χ_1^+	χ_1^-	x_1^-	x_1^+	x_1^-
$D_{3dx}(C_{3i})$	$\overline{3}_zm'_x$	χ_1^-	χ_2^+	χ_2^-	x_1^-	x_2^+	x_2^-
$D_{3dx}(D_{3x})$	$\overline{3}'m'_x$	χ_1^-	χ_1^-	χ_1^+	x_1^-	x_1^-	x_1^+
$D_{3dx}(C_{3vx})$	$\overline{3}'_zm_x$	χ_1^-	χ_2^-	χ_2^+	x_1^-	x_2^-	x_2^+
Noncentrosymmetric paramagnetic groups isomorphic with centrosymmetric group $D_{3dx} - \overline{3}_zm_x$							
D'_{3x}	$3_z2_x.1'$	χ_{1e}	χ_{1m}	χ_{1m}	x_{1e}	x_{1m}	x_{1m}
C'_{3vx}	$3_zm_x.1'$	χ_{2e}	χ_{1m}	χ_{2m}	x_{2e}	x_{1m}	x_{2m}
Centrosymmetric paramagnetic group $D'_{3dx} - \overline{3}_zm_x.1'$							
D'_{3dx}	$\overline{3}_zm_x.1'$	χ_{1e}^-	χ_{1m}^+	χ_{1m}^-	x_{1e}^-	x_{1m}^+	x_{1m}^-

Laue class C_6

Magnetic point groups, isomorphic with proper rotation group $C_6 - 6_z$							
		Ireps associated with inversions			Transformation properties of nontrivial scalars		
Class	Group	i	e'	i'	ε	τ	$\varepsilon\tau$
C_6	6_z	χ_1	χ_1	χ_1	x_1	x_1	x_1
$C_6(C_3)$	$6'_z$	χ_1	χ_3	χ_3	x_1	x_3	x_3
C_{3h}	$\overline{6}_z$	χ_3	χ_1	χ_3	x_3	x_1	x_3
$C_{3h}(C_3)$	$\overline{6}'_z$	χ_3	χ_3	χ_1	x_3	x_3	x_1
Nonparamagnetic point groups isomorphic with centrosymmetric group $C_{6h} - 6_z/m_z$							
C_{6h}	$6_z/m_z$	χ_1^-	χ_1^+	χ_1^-	x_1^-	x_1^+	x_1^-
$C_{6h}(C_{3i})$	$6'_z/m'_z$	χ_1^-	χ_3^+	χ_3^-	x_1^-	x_3^+	x_3^-
$C_{6h}(C_6)$	$6_z/m'_z$	χ_1^-	χ_1^-	χ_1^+	x_1^-	x_1^-	x_1^+
$C_{6h}(C_{3h})$	$6'_z/m_z$	χ_1^-	χ_3^-	χ_3^+	x_1^-	x_3^-	x_3^+
Noncentrosymmetric paramagnetic groups isomorphic with centrosymmetric group $C_{6h} - 6_z/m_z$							
C'_6	$6_z.1'$	χ_{1e}	χ_{1m}	χ_{1m}	x_{1e}	x_{1m}	x_{1m}
C'_{3h}	$\overline{6}_z.1'$	χ_{2e}	χ_{1m}	χ_{2m}	x_{2e}	x_{1m}	x_{2m}
Centrosymmetric paramagnetic group $C'_{6h} - \overline{6}_z/m_z.1'$							
C'_{6h}	$\overline{6}_z/m_z.1'$	χ_{1e}^-	χ_{1m}^+	χ_{1m}^-	x_{1e}^-	x_{1m}^+	x_{1m}^-

Laue class D_6

Magnetic point groups, isomorphic with proper rotation group $D_6 \ - \ 6_z2_x2_y$							
		Ireps associated with inversions			Transformation properties of nontrivial scalars		
Class	Group	i	e'	i'	ε	τ	$\varepsilon\tau$
D_6	$6_z2_x2_y$	χ_1	χ_1	χ_1	x_1	x_1	x_1
$D_6(C_6)$	$6_z2'_x2'_y$	χ_1	χ_2	χ_2	x_1	x_2	x_2
$D_6(D_{3x})$	$6'_z2_x2'_y$	χ_1	χ_3	χ_3	x_1	x_3	x_3
$D_6(D_{3y})$	$6'_z2'_x2_y$	χ_1	χ_4	χ_4	x_1	x_4	x_4
C_{6v}	$6_zm_xm_y$	χ_2	χ_1	χ_2	x_2	x_1	x_2
$C_{6v}(C_6)$	$6_zm'_xm'_{xy}$	χ_2	χ_2	χ_1	x_2	x_2	x_1
$C_{6v}(C_{3vx})$	$6'_zm_xm'_y$	χ_2	χ_3	χ_4	x_2	x_3	x_4
$C_{6v}(C_{3vy})$	$6'_zm'_xm_y$	χ_2	χ_4	χ_3	x_2	x_4	x_3
D_{3hx}	$\overline{6}_z2_xm_y$	χ_3	χ_1	χ_3	x_3	x_1	x_3
$D_{3hx}(C_{3h})$	$\overline{6}_z2'_xm'_y$	χ_3	χ_2	χ_4	x_3	x_2	x_4
$D_{3hx}(D_{3x})$	$\overline{6}'_z2_xm'_y$	χ_3	χ_3	χ_1	x_3	x_3	x_1
$D_{3hx}(C_{3vy})$	$\overline{6}'_z2'_xm_y$	χ_3	χ_4	χ_2	x_3	x_4	x_2
D_{3hy}	$\overline{6}_zm_x2_y$	χ_4	χ_1	χ_4	x_4	x_1	x_4
$D_{3hy}(C_{3h})$	$\overline{6}_zm'_x2'_y$	χ_4	χ_2	χ_3	x_4	x_2	x_3
$D_{3hy}(C_{3vx})$	$\overline{6}'_zm_x2'_y$	χ_4	χ_3	χ_2	x_4	x_3	x_2
$D_{3hy}(D_{3y})$	$\overline{6}'_zm'_x2_y$	χ_4	χ_4	χ_1	x_4	x_4	x_1

Laue class D_6 - (cont.)

Nonparamagnetic point groups isomorphic with centrosymetric group $D_{6h} - 6_z/m_z m_x m_y$							
		Ireps associated with inversions			Transformation properties of nontrivial scalars		
Class	Group	i	e'	i'	ε	τ	$\varepsilon\tau$
D_{6h}	$6_z/m_z m_x m_y$	χ_1^-	χ_1^+	χ_1^-	x_1^-	x_1^+	x_1^-
$D_{6h}(C_{6h})$	$6_z/m_z m'_x m'_y$	χ_1^-	χ_2^+	χ_2^-	x_1^-	x_2^+	x_2^-
$D_{6h}(D_{3dx})$	$6'_z/m_z m_x m'_y$	χ_1^-	χ_3^+	χ_3^-	x_1^-	x_3^+	x_3^-
$D_{6h}(D_{3dy})$	$6'_z/m_z m'_x m_y$	χ_1^-	χ_4^+	χ_4^-	x_1^-	x_4^+	x_4^-
$D_{6h}(D_6)$	$6_z/m'_z m'_x m'_y$	χ_1^-	χ_1^-	χ_1^+	x_1^-	x_1^-	x_1^+
$D_{6h}(C_{6v})$	$6_z/m'_z m_x m_y$	χ_1^-	χ_2^-	χ_2^+	x_1^-	x_2^-	x_2^+
$D_{6h}(D_{3hx})$	$6'_z/m'_z m'_x m_y$	χ_1^-	χ_3^-	χ_3^+	x_1^-	x_3^-	x_3^+
$D_{6h}(D_{3hy})$	$6'_z/m'_z m_x m'_y$	χ_1^-	χ_4^-	χ_4^+	x_1^-	x_4^-	x_4^+
Noncentrosymmetric paramagnetic groups isomorphic with centrosymetric group $D_{6h} - 6_z/m_z m_x m_y$							
D'_6	$6_z 2_x 2_y.1'$	χ_{1e}	χ_{1m}	χ_{1m}	x_{1e}	x_{1m}	x_{1m}
C'_{6v}	$6_z m_x m_y.1'$	χ_{2e}	χ_{1m}	χ_{2m}	x_{2e}	x_{1m}	x_{2m}
D'_{3hx}	$\overline{6}_z 2_x m_y.1'$	χ_{3e}	χ_{1m}	χ_{3m}	x_{3e}	x_{1m}	x_{3m}
D'_{3hy}	$\overline{6}_z m_x 2_y.1'$	χ_{4e}	χ_{1m}	χ_{4m}	x_{4e}	x_{1m}	x_{4m}
Centrosymmetric paramagnetic group $D'_{6h} - 6_z/m_z m_x m_y.1'$							
D'_{6h}	$6_z/m_z m_x m_y.1'$	χ_{1e}^-	χ_{1m}^+	χ_{1m}^-	x_{1e}^-	x_{1m}^+	x_{1m}^-

Laue class T

Group of proper rotations T – 23							
		Ireps associated with inversions			Transformation properties of nontrivial scalars		
Class	Group	i	e'	i'	ε	τ	$\varepsilon\tau$
T	23	χ_1	χ_1	χ_1	x_1	x_1	x_1
Centrosymmetric point group $T_h - m\overline{3}$ and its isomorphic nonparamagnetic group							
T_h	$m\overline{3}$	χ_1^-	χ_1^+	χ_1^-	x_1^-	x_1^+	x_1^-
$T_h(T)$	$m'\overline{3}'$	χ_1^-	χ_1^-	χ_1^+	x_1^-	x_1^-	x_1^+
Noncentrosymmetric paramagnetic group isomorphic with centrosymmetric group $T_h - m\overline{3}$							
T'	$23.1'$	χ_{1e}	χ_{1m}	χ_{1m}	x_{1e}	x_{1m}	x_{1m}
Centrosymmetric paramagnetic group T_h' – $m\overline{3}.1'$							
T_h'	$m\overline{3}.1'$	χ_{1e}^-	χ_{1m}^+	χ_{1m}^-	x_{1e}^-	x_{1m}^+	x_{1m}^-

Laue class O

Magnetic point groups, isomorphic with proper rotation group O – 432							
		Ireps associated with inversions			Transformation properties of nontrivial scalars		
Class	Group	i	e'	i'	ε	τ	$\varepsilon\tau$
O	432	χ_1	χ_1	χ_1	x_1	x_1	x_1
$O(T)$	$4'32'$	χ_1	χ_2	χ_2	x_1	x_2	x_2
T_d	$\overline{4}3m$	χ_2	χ_1	χ_2	x_2	x_1	x_2
$T_d(T)$	$\overline{4}'3m'$	χ_2	χ_2	χ_1	x_2	x_2	x_1
Nonparamagnetic point groups isomorphic with centrosymmetric group O_h – $m\overline{3}m$							
O_h	$m\overline{3}m$	χ_1^-	χ_1^+	χ_1^-	x_1^-	x_1^+	x_1^-
$O_h(T_h)$	$m\overline{3}m'$	χ_1^-	χ_2^+	χ_2^-	x_1^-	x_2^+	x_2^-
$O_h(O)$	$m'\overline{3}'m'$	χ_1^-	χ_1^-	χ_1^+	x_1^-	x_1^-	x_1^+
$O_h(T_d)$	$m'\overline{3}'m$	χ_1^-	χ_2^-	χ_2^+	x_1^-	x_2^-	x_2^+
Noncentrosymmetric paramagnetic groups isomorphic with centrosymmetric group O_h – $m\overline{3}m$							
O'	$432.1'$	χ_{1e}	χ_{1m}	χ_{1m}	x_{1e}	x_{1m}	x_{1m}
T_d'	$\overline{4}3m.1'$	χ_{2e}	χ_{1m}	χ_{2m}	x_{2e}	x_{1m}	x_{2m}
Centrosymmetric paramagnetic group O_h' – $m\overline{3}m.1'$							
O_h'	$m\overline{3}m.1'$	χ_{1e}^-	χ_{1m}^+	χ_{1m}^-	x_{1e}^-	x_{1m}^+	x_{1m}^-

Noncrystallographic finite groups

Laue class C_n; $n = 2k + 1$ (odd)

Group of proper rotations $C_n - n_z$							
		Ireps associated with inversions			Transformation properties of nontrivial scalars		
Class	Group	i	e'	i'	ε	τ	$\varepsilon\tau$
C_n	n_z	χ_1	χ_1	χ_1	x_1	x_1	x_1
Centrosymmetric point group $C_{ni} - \overline{n}_z$ **and its isomorphic nonparamagnetic group**							
C_{ni}	$\overline{n}_z$	χ_1^-	χ_1^+	χ_1^-	x_1^-	x_1^+	x_1^-
$C_{ni}(C_n)$	$\overline{n}'_z$	χ_1^-	χ_1^-	χ_1^+	x_1^-	x_1^-	x_1^+
Noncentrosymmetric paramagnetic group isomorphic with centrosymmetric group $C_{ni} - \overline{n}_z$							
C'_n	$n_z.1'$	χ_{1e}	χ_{1m}	χ_{1m}	x_{1e}	x_{1m}	x_{1m}
Centrosymmetric paramagnetic group $C'_{ni} - \overline{n}_z.1'$							
C'_{ni}	$\overline{n}_z.1'$	χ_{1e}^-	χ_{1m}^+	χ_{1m}^-	x_{1e}^-	x_{1m}^+	x_{1m}^-

Laue class D_n; $n = 2k + 1$ (odd)

Magnetic point groups, isomorphic with proper rotation group $D_{nx} - n_z2_x$							
		Ireps associated with inversions			Transformation properties of nontrivial scalars		
Class	Group	i	e'	i'	ε	τ	$\varepsilon\tau$
D_{nx}	n_z2_x	χ_1	χ_1	χ_1	x_1	x_1	x_1
$D_{nx}(C_n)$	$n_z2'_x$	χ_1	χ_2	χ_2	x_1	x_2	x_2
C_{nvx}	n_zm_x	χ_2	χ_1	χ_2	x_2	x_1	x_2
$C_{nvx}(C_n)$	$n_zm'_x$	χ_2	χ_2	χ_1	x_2	x_2	x_1
Nonparamagnetic point groups isomorphic with centrosymmetric group $D_{ndx} - \overline{n}_zm_x$							
D_{ndx}	$\overline{n}_zm_x$	χ_1^-	χ_1^+	χ_1^-	x_1^-	x_1^+	x_1^-
$D_{ndx}(C_{ni})$	$\overline{n}_zm'_x$	χ_1^-	χ_2^+	χ_2^-	x_1^-	x_2^+	x_2^-
$D_{ndx}(D_{nx})$	$\overline{n}'m'_x$	χ_1^-	χ_1^-	χ_1^+	x_1^-	x_1^-	x_1^+
$D_{ndx}(C_{nvx})$	$\overline{n}'_zm_x$	χ_1^-	χ_2^-	χ_2^+	x_1^-	x_2^-	x_2^+
Noncentrosymmetric paramagnetic groups isomorphic with centrosymmetric group $D_{ndx} - \overline{n}_zm_x$							
D'_{nx}	$n_z2_x.1'$	χ_{1e}	χ_{1m}	χ_{1m}	x_{1e}	x_{1m}	x_{1m}
C'_{nvx}	$n_zm_x.1'$	χ_{2e}	χ_{1m}	χ_{2m}	x_{2e}	x_{1m}	x_{2m}
Centrosymmetric paramagnetic group $D'_{ndx} - \overline{n}_zm_x.1'$							
D'_{ndx}	$\overline{n}_zm_x.1'$	χ_{1e}^-	χ_{1m}^+	χ_{1m}^-	x_{1e}^-	x_{1m}^+	x_{1m}^-

Laue class C_n; $n = 4k$ (even-even)

Magnetic point groups, isomorphic with proper rotation group C_n – n_z							
		Ireps associated with inversions			Transformation properties of nontrivial scalars		
Class	Group	i	e'	i'	ε	τ	$\varepsilon\tau$
C_n	n_z	χ_1	χ_1	χ_1	x_1	x_1	x_1
$C_n(C_{\frac{n}{2}})$	n'_z	χ_1	χ_3	χ_3	x_1	x_3	x_3
S_n	$\overline{n}_z$	χ_3	χ_1	χ_3	x_3	x_1	x_3
$S_n(C_{\frac{n}{2}})$	$\overline{n}'_z$	χ_3	χ_3	χ_1	x_3	x_3	x_1
Nonparamagnetic point groups isomorphic with centrosymmetric group C_{nh} – n_z/m_z							
C_{nh}	n_z/m_z	χ_1^-	χ_1^+	χ_1^-	x_1^-	x_1^+	x_1^-
$C_{nh}(C_{\frac{n}{2}h})$	n'_z/m_z	χ_1^-	χ_3^+	χ_3^-	x_1^-	x_3^+	x_3^-
$C_{nh}(C_n)$	n_z/m'_z	χ_1^-	χ_1^-	χ_1^+	x_1^-	x_1^-	x_1^+
$C_{nh}(S_n)$	n'_z/m'_z	χ_1^-	χ_3^-	χ_3^+	x_1^-	x_3^-	x_3^+
Noncentrosymmetric paramagnetic groups isomorphic with centrosymmetric group C_{nh} – n_z/m_z							
C'_n	$n_z.1'$	χ_{1e}	χ_{1m}	χ_{1m}	x_{1e}	x_{1m}	x_{1m}
S'_n	$\overline{n}_z.1'$	χ_{2e}	χ_{1m}	χ_{2m}	x_{2e}	x_{1m}	x_{2m}
Centrosymmetric paramagnetic group C'_{nh} – $n_z/m_z.1'$							
C'_{nh}	$n_z/m_z.1'$	χ_{1e}^-	χ_{1m}^+	χ_{1m}^-	x_{1e}^-	x_{1m}^+	x_{1m}^-

Laue class D_n; $n = 4k$ (even-even)

Magnetic point groups, isomorphic with proper rotation group D_n – $n_z 2_x 2_{xy}$							
		Ireps associated with inversions			Transformation properties of nontrivial scalars		
Class	Group	i	e'	i'	ε	τ	$\varepsilon\tau$
D_n	$n_z 2_x 2_{xy}$	χ_1	χ_1	χ_1	x_1	x_1	x_1
$D_n(C_n)$	$n_z 2'_x 2'_{xy}$	χ_1	χ_2	χ_2	x_1	x_2	x_2
$D_n(D_{\frac{n}{2}})$	$n'_z 2_x 2'_{xy}$	χ_1	χ_3	χ_3	x_1	x_3	x_3
$D_n(\widehat{D}_{\frac{n}{2}})$	$n'_z 2'_x 2_{xy}$	χ_1	χ_4	χ_4	x_1	x_4	x_4
C_{nv}	$n_z m_x m_{xy}$	χ_2	χ_1	χ_2	x_2	x_1	x_2
$C_{nv}(C_n)$	$n_z m'_x m'_{xy}$	χ_2	χ_2	χ_1	x_2	x_2	x_1
$C_{nv}(C_{\frac{n}{2}v})$	$n'_z m_x m'_{xy}$	χ_2	χ_3	χ_4	x_2	x_3	x_4
$C_{nv}(\widehat{C}_{\frac{n}{2}v})$	$n'_z m'_x m_{xy}$	χ_2	χ_4	χ_3	x_2	x_4	x_3
$D_{\frac{n}{2}d}$	$\overline{n}_z 2_x m_{xy}$	χ_3	χ_1	χ_3	x_3	x_1	x_3
$D_{\frac{n}{2}d}(S_n)$	$\overline{n}_z 2'_x m'_{xy}$	χ_3	χ_2	χ_4	x_3	x_2	x_4
$D_{\frac{n}{2}d}(D_{\frac{n}{2}})$	$\overline{n}'_z 2_x m'_{xy}$	χ_3	χ_3	χ_1	x_3	x_3	x_1
$D_{\frac{n}{2}d}(\widehat{C}_{\frac{n}{2}v})$	$\overline{n}'_z 2'_x m_{xy}$	χ_3	χ_4	χ_2	x_3	x_4	x_2
$\widehat{D}_{\frac{n}{2}d}$	$\overline{n}_z m_x 2_{xy}$	χ_4	χ_1	χ_4	x_4	x_1	x_4
$\widehat{D}_{\frac{n}{2}d}(S_n)$	$\overline{n}_z m'_x 2'_{xy}$	χ_4	χ_2	χ_3	x_4	x_2	x_3
$\widehat{D}_{\frac{n}{2}d}(C_{\frac{n}{2}v})$	$\overline{n}'_z m_x 2'_{xy}$	χ_4	χ_3	χ_2	x_4	x_3	x_2
$\widehat{D}_{\frac{n}{2}d}(\widehat{D}_{\frac{n}{2}})$	$\overline{n}'_z m'_x 2_{xy}$	χ_4	χ_4	χ_1	x_4	x_4	x_1

Laue class D_n - (cont.)

Nonparamagnetic point groups isomorphic with centrosymetric group $D_{nh} - n_z/m_z m_x m_{xy}$							
		Ireps associated with inversions			Transformation properties of nontrivial scalars		
Class	Group	i	e'	i'	ε	τ	$\varepsilon\tau$
D_{nh}	$n_z/m_z m_x m_{xy}$	χ_1^-	χ_1^+	χ_1^-	x_1^-	x_1^+	x_1^-
$D_{nh}(C_{nh})$	$n_z/m_z m'_x m'_{xy}$	χ_1^-	χ_2^+	χ_2^-	x_1^-	x_2^+	x_2^-
$D_{nh}(D_{\frac{n}{2}h})$	$n'_z/m_z m_x m'_{xy}$	χ_1^-	χ_3^+	χ_3^-	x_1^-	x_3^+	x_3^-
$D_{nh}(\widehat{D}_{\frac{n}{2}h})$	$n'_z/m_z m'_x m_{xy}$	χ_1^-	χ_4^+	χ_4^-	x_1^-	x_4^+	x_4^-
$D_{nh}(D_n)$	$n_z/m'_z m'_x m'_{xy}$	χ_1^-	χ_1^-	χ_1^+	x_1^-	x_1^-	x_1^+
$D_{nh}(C_{nv})$	$n_z/m'_z m_x m_{xy}$	χ_1^-	χ_2^-	χ_2^+	x_1^-	x_2^-	x_2^+
$D_{nh}(D_{\frac{n}{2}d})$	$n'_z/m'_z m'_x m_{xy}$	χ_1^-	χ_3^-	χ_3^+	x_1^-	x_3^-	x_3^+
$D_{nh}(\widehat{D}_{\frac{n}{2}d})$	$n'_z/m'_z m_x m'_{xy}$	χ_1^-	χ_4^-	χ_4^+	x_1^-	x_4^-	x_4^+
Noncentrosymmetric paramagnetic groups isomorphic with centrosymetric group $D_{nh} - n_z/m_z m_x m_{xy}$							
D'_n	$n_z 2_x 2_{xy}.1'$	χ_{1e}	χ_{1m}	χ_{1m}	x_{1e}	x_{1m}	x_{1m}
C'_{nv}	$n_z m_x m_{xy}.1'$	χ_{2e}	χ_{1m}	χ_{2m}	x_{2e}	x_{1m}	x_{2m}
$D'_{\frac{n}{2}d}$	$\overline{n}_z 2_x m_{xy}.1'$	χ_{3e}	χ_{1m}	χ_{3m}	x_{3e}	x_{1m}	x_{3m}
$\widehat{D}'_{\frac{n}{2}d}$	$\overline{n}_z m_x 2_{xy}.1'$	χ_{4e}	χ_{1m}	χ_{4m}	x_{4e}	x_{1m}	x_{4m}
Centrosymmetric paramagnetic group $D'_{nh} - n_z/m_z m_x m_{xy}.1'$							
D'_{nh}	$n_z/m_z m_x m_{xy}.1'$	χ_{1e}^-	χ_{1m}^+	χ_{1m}^-	x_{1e}^-	x_{1m}^+	x_{1m}^-

Laue class C_n; $n = 4k + 2$ (even-odd)

Magnetic point groups, isomorphic with proper rotation group C_n – n_z							
		Ireps associated with inversions			Transformation properties of nontrivial scalars		
Class	Group	i	e'	i'	ε	τ	$\varepsilon\tau$
C_n	n_z	χ_1	χ_1	χ_1	x_1	x_1	x_1
$C_n(C_{\frac{n}{2}})$	n'_z	χ_1	χ_3	χ_3	x_1	x_3	x_3
$C_{\frac{n}{2}h}$	$\overline{n}_z$	χ_3	χ_1	χ_3	x_3	x_1	x_3
$C_{\frac{n}{2}h}(C_{\frac{n}{2}})$	$\overline{n}'_z$	χ_3	χ_3	χ_1	x_3	x_3	x_1
Nonparamagnetic point groups isomorphic with centrosymmetric group C_{nh} – n_z/m_z							
C_{nh}	n_z/m_z	χ_1^-	χ_1^+	χ_1^-	x_1^-	x_1^+	x_1^-
$C_{nh}(C_{\frac{n}{2}i})$	n'_z/m'_z	χ_1^-	χ_3^+	χ_3^-	x_1^-	x_3^+	x_3^-
$C_{nh}(C_n)$	n_z/m'_z	χ_1^-	χ_1^-	χ_1^+	x_1^-	x_1^-	x_1^+
$C_{nh}(C_{\frac{n}{2}h})$	n'_z/m_z	χ_1^-	χ_3^-	χ_3^+	x_1^-	x_3^-	x_3^+
Noncentrosymmetric paramagnetic groups isomorphic with centrosymmetric group C_{nh} – n_z/m_z							
C'_n	$n_z.1'$	χ_{1e}	χ_{1m}	χ_{1m}	x_{1e}	x_{1m}	x_{1m}
$C'_{\frac{n}{2}h}$	$\overline{n}_z.1'$	χ_{2e}	χ_{1m}	χ_{2m}	x_{2e}	x_{1m}	x_{2m}
Centrosymmetric paramagnetic group C'_{nh} – $\overline{n}_z/m_z.1'$							
C'_{nh}	$\overline{n}_z/m_z.1'$	χ_{1e}^-	χ_{1m}^+	χ_{1m}^-	x_{1e}^-	x_{1m}^+	x_{1m}^-

Laue class D_n; $n = 4k + 2$ (even-odd)

Magnetic point groups, isomorphic with proper rotation group $D_n\ -\ n_z 2_x 2_y$							
		Ireps associated with inversions			Transformation properties of nontrivial scalars		
Class	Group	i	e'	i'	ε	τ	$\varepsilon\tau$
D_n	$n_z 2_x 2_y$	χ_1	χ_1	χ_1	x_1	x_1	x_1
$D_n(C_n)$	$n_z 2'_x 2'_y$	χ_1	χ_2	χ_2	x_1	x_2	x_2
$D_n(D_{\frac{n}{2}}x)$	$n'_z 2_x 2'_y$	χ_1	χ_3	χ_3	x_1	x_3	x_3
$D_n(D_{\frac{n}{2}}y)$	$n'_z 2'_x 2_y$	χ_1	χ_4	χ_4	x_1	x_4	x_4
C_{nv}	$n_z m_x m_y$	χ_2	χ_1	χ_2	x_2	x_1	x_2
$C_{nv}(C_n)$	$n_z m'_x m'_{xy}$	χ_2	χ_2	χ_1	x_2	x_2	x_1
$C_{nv}(C_{\frac{n}{2}}vx)$	$n'_z m_x m'_y$	χ_2	χ_3	χ_4	x_2	x_3	x_4
$C_{nv}(C_{\frac{n}{2}}vy)$	$n'_z m'_x m_y$	χ_2	χ_4	χ_3	x_2	x_4	x_3
$D_{\frac{n}{2}}hx$	$\overline{n}_z 2_x m_y$	χ_3	χ_1	χ_3	x_3	x_1	x_3
$D_{\frac{n}{2}}hx(C_{\frac{n}{2}}h)$	$\overline{n}_z 2'_x m'_y$	χ_3	χ_2	χ_4	x_3	x_2	x_4
$D_{\frac{n}{2}}hx(D_{\frac{n}{2}}x)$	$\overline{n}'_z 2_x m'_y$	χ_3	χ_3	χ_1	x_3	x_3	x_1
$D_{\frac{n}{2}}hx(C_{\frac{n}{2}}vy)$	$\overline{n}'_z 2'_x m_y$	χ_3	χ_4	χ_2	x_3	x_4	x_2
$D_{\frac{n}{2}}hy$	$\overline{n}_z m_x 2_y$	χ_4	χ_1	χ_4	x_4	x_1	x_4
$D_{\frac{n}{2}}hy(C_{\frac{n}{2}}h)$	$\overline{n}_z m'_x 2'_y$	χ_4	χ_2	χ_3	x_4	x_2	x_3
$D_{\frac{n}{2}}hy(C_{\frac{n}{2}}vx)$	$\overline{n}'_z m_x 2'_y$	χ_4	χ_3	χ_2	x_4	x_3	x_2
$D_{\frac{n}{2}}hy(D_{\frac{n}{2}}y)$	$\overline{n}'_z m'_x 2_y$	χ_4	χ_4	χ_1	x_4	x_4	x_1

Laue class D_n - (cont.)

Nonparamagnetic point groups isomorphic with centrosymetric group $D_{nh} - n_z/m_z m_x m_y$							
		Ireps associated with inversions			Transformation properties of nontrivial scalars		
Class	Group	i	e'	i'	ε	τ	$\varepsilon\tau$
D_{nh}	$n_z/m_z m_x m_y$	χ_1^-	χ_1^+	χ_1^-	x_1^-	x_1^+	x_1^-
$D_{nh}(C_{nh})$	$n_z/m_z m'_x m'_y$	χ_1^-	χ_2^+	χ_2^-	x_1^-	x_2^+	x_2^-
$D_{nh}(D_{\frac{n}{2}dx})$	$n'_z/m_z m_x m'_y$	χ_1^-	χ_3^+	χ_3^-	x_1^-	x_3^+	x_3^-
$D_{nh}(D_{\frac{n}{2}dy})$	$n'_z/m_z m'_x m_y$	χ_1^-	χ_4^+	χ_4^-	x_1^-	x_4^+	x_4^-
$D_{nh}(D_n)$	$n_z/m'_z m'_x m'_y$	χ_1^-	χ_1^-	χ_1^+	x_1^-	x_1^-	x_1^+
$D_{nh}(C_{nv})$	$n_z/m'_z m_x m_y$	χ_1^-	χ_2^-	χ_2^+	x_1^-	x_2^-	x_2^+
$D_{nh}(D_{\frac{n}{2}hx})$	$n'_z/m'_z m'_x m_y$	χ_1^-	χ_3^-	χ_3^+	x_1^-	x_3^-	x_3^+
$D_{nh}(D_{\frac{n}{2}hy})$	$n'_z/m'_z m_x m'_y$	χ_1^-	χ_4^-	χ_4^+	x_1^-	x_4^-	x_4^+
Noncentrosymmetric paramagnetic groups isomorphic with centrosymetric group $D_{nh} - n_z/m_z m_x m_y$							
D'_n	$n_z 2_x 2_y .1'$	χ_{1e}	χ_{1m}	χ_{1m}	x_{1e}	x_{1m}	x_{1m}
C'_{nv}	$n_z m_x m_y .1'$	χ_{2e}	χ_{1m}	χ_{2m}	x_{2e}	x_{1m}	x_{2m}
$D'_{\frac{n}{2}hx}$	$\overline{n}_z 2_x m_y .1'$	χ_{3e}	χ_{1m}	χ_{3m}	x_{3e}	x_{1m}	x_{3m}
$D'_{\frac{n}{2}hy}$	$\overline{n}_z m_x 2_y .1'$	χ_{4e}	χ_{1m}	χ_{4m}	x_{4e}	x_{1m}	x_{4m}
Centrosymmetric paramagnetic group $D'_{nh} - n_z/m_z m_x m_y .1'$							
D'_{nh}	$n_z/m_z m_x m_y .1'$	χ_{1e}^-	χ_{1m}^+	χ_{1m}^-	x_{1e}^-	x_{1m}^+	x_{1m}^-

Laue class I - icosahedral groups

Group of proper rotations I – 235							
		Ireps associated with inversions			Transformation properties of nontrivial scalars		
Class	Group	i	e'	i'	ε	τ	$\varepsilon\tau$
I	235	χ_1	χ_1	χ_1	x_1	x_1	x_1
Centrosymmetric point group $T_h - m\overline{3}$ and its isomorphic nonparamagnetic group							
I_h	$m\overline{3}\,\overline{5}$	χ_1^-	χ_1^+	χ_1^-	x_1^-	x_1^+	x_1^-
$I_h(I)$	$m'\overline{3}'\,\overline{5}'$	χ_1^-	χ_1^-	χ_1^+	x_1^-	x_1^-	x_1^+
Noncentrosymmetric paramagnetic group isomorphic with centrosymmetric group $I_h - m\overline{3}\,\overline{5}$							
I'	$235.1'$	χ_{1e}	χ_{1m}	χ_{1m}	x_{1e}	x_{1m}	x_{1m}
Centrosymmetric paramagnetic group I'_h – $m\overline{3}\,\overline{5}.1'$							
I'_h	$m\overline{3}\,\overline{5}.1'$	χ_{1e}^-	χ_{1m}^+	χ_{1m}^-	x_{1e}^-	x_{1m}^+	x_{1m}^-

Infinite groups

Laue class C_∞

Group of proper rotations $C_\infty - \infty_z$							
		Ireps associated with inversions			Transformation properties of nontrivial scalars		
Class	Group	i	e'	i'	ε	τ	$\varepsilon\tau$
C_∞	∞_z	χ_1	χ_1	χ_1	x_1	x_1	x_1
Centrosymmetric point group $C_{\infty h} - \infty_z/m_z$ and its isomorphic nonparamagnetic group							
$C_{\infty h}$	∞_z/m_z	χ_1^-	χ_1^+	χ_1^-	x_1^-	x_1^+	x_1^-
$C_{\infty h}(C_\infty)$	∞_z/m'_z	χ_1^-	χ_1^-	χ_1^+	x_1^-	x_1^-	x_1^+
Noncentrosymmetric paramagnetic group isomorphic with centrosymmetric group $C_{\infty h} - \infty_z/m_z$							
C'_∞	$\infty_z.1'$	χ_{1e}	χ_{1m}	χ_{1m}	x_{1e}	x_{1m}	x_{1m}
Centrosymmetric paramagnetic group $C'_{\infty h} - \infty_z/m_z.1'$							
$C'_{\infty h}$	$\infty_z/m_z.1'$	χ_{1e}^-	χ_{1m}^+	χ_{1m}^-	x_{1e}^-	x_{1m}^+	x_{1m}^-

Laue class D_∞

Magnetic point groups, isomorphic with proper rotation group D_∞ – $\infty_z 22$							
		Ireps associated with inversions			Transformation properties of nontrivial scalars		
Class	Group	i	e'	i'	ε	τ	$\varepsilon\tau$
D_∞	$\infty_z 22$	χ_1	χ_1	χ_1	x_1	x_1	x_1
$D_\infty(C_\infty)$	$\infty_z 2'2'$	χ_1	χ_2	χ_2	x_1	x_2	x_2
$C_{\infty v}$	$\infty_z mm$	χ_2	χ_1	χ_2	x_2	x_1	x_2
$C_{\infty v}(C_\infty)$	$\infty_z m'm'$	χ_2	χ_2	χ_1	x_2	x_2	x_1
Nonparamagnetic point groups isomorphic with centrosymmetric group $D_{\infty h}$ – $\infty_z/m_z mm$							
$D_{\infty h}$	$\infty_z/m_z mm$	χ_1^-	χ_1^+	χ_1^-	x_1^-	x_1^+	x_1^-
$D_{\infty h}(C_{\infty h})$	$\infty_z/m_z m'm'$	χ_1^-	χ_2^+	χ_2^-	x_1^-	x_2^+	x_2^-
$D_{\infty h}(D_\infty)$	$\infty_z/m'_z m'm'$	χ_1^-	χ_1^-	χ_1^+	x_1^-	x_1^-	x_1^+
$D_{\infty h}(C_{\infty v})$	$\infty'_z/m'_z mm$	χ_1^-	χ_2^-	χ_2^+	x_1^-	x_2^-	x_2^+
Noncentrosymmetric paramagnetic groups isomorphic with centrosymmetric group $D_{\infty h}$ – $\infty_z/m_z mm$							
D'_∞	$\infty_z 22.1'$	χ_{1e}	χ_{1m}	χ_{1m}	x_{1e}	x_{1m}	x_{1m}
$C'_{\infty v}$	$\infty_z mm.1'$	χ_{2e}	χ_{1m}	χ_{2m}	x_{2e}	x_{1m}	x_{2m}
Centrosymmetric paramagnetic group $D'_{\infty h}$ – $\infty_z/m_z mm.1'$							
$D'_{\infty h}$	$\infty_z/m_z mm.1'$	χ_{1e}^-	χ_{1m}^+	χ_{1m}^-	x_{1e}^-	x_{1m}^+	x_{1m}^-

Laue class $\mathcal{SO}(3)$

Group of proper rotations $\mathcal{SO}(3)\ -\ 2\infty$							
		Ireps associated with inversions			Transformation properties of nontrivial scalars		
Class	Group	i	e'	i'	ε	τ	$\varepsilon\tau$
$\mathcal{SO}(3)$	2∞	χ_1	χ_1	χ_1	x_1	x_1	x_1
Centrosymmetric point group $\mathcal{O}(3) - 2/m.\overline{\infty}$ and its isomorphic nonparamagnetic group							
$\mathcal{O}(3)$	$2/m.\overline{\infty}$	χ_1^-	χ_1^+	χ_1^-	x_1^-	x_1^+	x_1^-
$\mathcal{O}(3)[\mathcal{SO}(3)]$	$2/m'.\overline{\infty}$	χ_1^-	χ_1^-	χ_1^+	x_1^-	x_1^-	x_1^+
Noncentrosymmetric paramagnetic group isomorphic with centrosymmetric group $\mathcal{O}(3) - 2/m.\overline{\infty}$							
$\mathcal{SO}'(3)$	$2\infty.1'$	χ_{1e}	χ_{1m}	χ_{1m}	x_{1e}	x_{1m}	x_{1m}
Centrosymmetric paramagnetic group $\mathcal{O}'(3)\ -\ 2/m.\overline{\infty}.1'$							
$\mathcal{O}'(3)$	$2/m.\overline{\infty}.1'$	χ_{1e}^-	χ_{1m}^+	χ_{1m}^-	x_{1e}^-	x_{1m}^+	x_{1m}^-