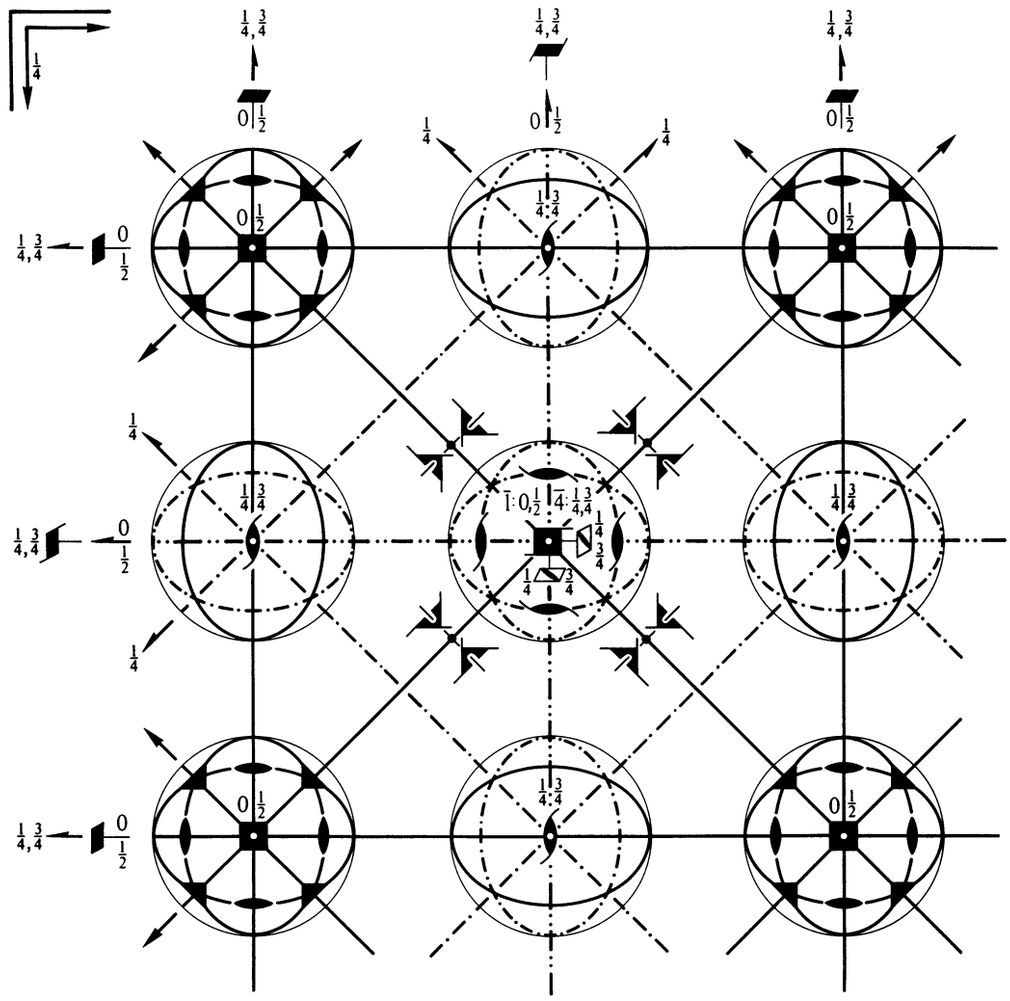
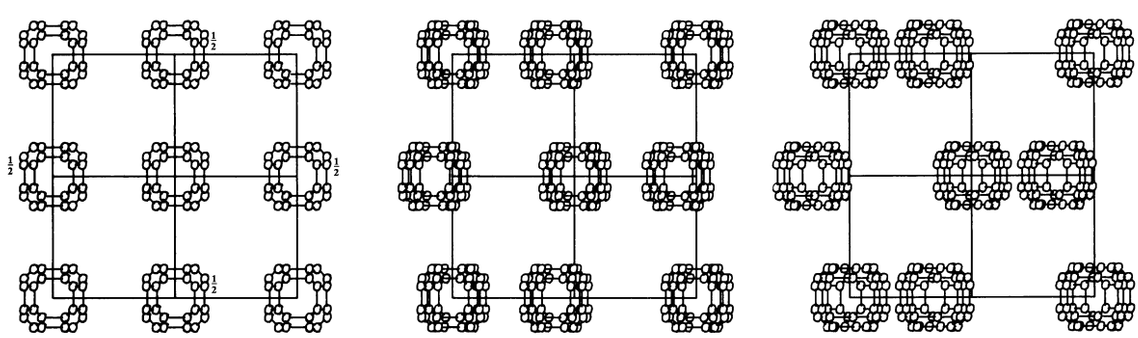
International Tables for Crystallography (2006). Vol. A, Space group 225, pp. 688–691.

$F\,m\bar{3}\,m$ $\quad O_h^5$ $\quad m\bar{3}\,m$ $\quad$ Cubic

No. 225 $\quad F\ 4/m\ \bar{3}\ 2/m$ $\quad$ Patterson symmetry $F\,m\bar{3}\,m$



Upper left quadrant only



Origin at centre $(m\bar{3}\,m)$

Asymmetric unit $\quad 0 \le x \le \frac{1}{2};\quad 0 \le y \le \frac{1}{4};\quad 0 \le z \le \frac{1}{4};\quad y \le \min(x, \frac{1}{2} - x);\quad z \le y$

Vertices $\quad 0,0,0 \quad \frac{1}{2},0,0 \quad \frac{1}{4},\frac{1}{4},0 \quad \frac{1}{4},\frac{1}{4},\frac{1}{4}$

Symmetry operations

(*given on page* 691)

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Generators selected (1); $t(1,0,0)$; $t(0,1,0)$; $t(0,0,1)$; $t(0,\frac{1}{2},\frac{1}{2})$; $t(\frac{1}{2},0,\frac{1}{2})$; (2); (3); (5); (13); (25)

Positions

Multiplicity, Wyckoff letter, Site symmetry			Coordinates $(0,0,0)+$	$(0,\frac{1}{2},\frac{1}{2})+$	$(\frac{1}{2},0,\frac{1}{2})+$	$(\frac{1}{2},\frac{1}{2},0)+$			Reflection conditions
									h,k,l permutable
									General:
192	l	1	(1) x,y,z	(2) $\bar{x},\bar{y},z$	(3) $\bar{x},y,\bar{z}$	(4) $x,\bar{y},\bar{z}$			hkl : $h+k,h+l,k+l=2n$
			(5) z,x,y	(6) $z,\bar{x},\bar{y}$	(7) $\bar{z},\bar{x},y$	(8) $\bar{z},x,\bar{y}$			$0kl$: $k,l=2n$
			(9) y,z,x	(10) $\bar{y},z,\bar{x}$	(11) $y,\bar{z},\bar{x}$	(12) $\bar{y},\bar{z},x$			hhl : $h+l=2n$
			(13) $y,x,\bar{z}$	(14) $\bar{y},\bar{x},\bar{z}$	(15) $y,\bar{x},z$	(16) $\bar{y},x,z$			$h00$: $h=2n$
			(17) $x,z,\bar{y}$	(18) $\bar{x},z,y$	(19) $\bar{x},\bar{z},\bar{y}$	(20) $x,\bar{z},y$			
			(21) $z,y,\bar{x}$	(22) $z,\bar{y},x$	(23) $\bar{z},y,x$	(24) $\bar{z},\bar{y},\bar{x}$			
			(25) $\bar{x},\bar{y},\bar{z}$	(26) $x,y,\bar{z}$	(27) $x,\bar{y},z$	(28) $\bar{x},y,z$			
			(29) $\bar{z},\bar{x},\bar{y}$	(30) $\bar{z},x,y$	(31) $z,x,\bar{y}$	(32) $z,\bar{x},y$			
			(33) $\bar{y},\bar{z},\bar{x}$	(34) $y,\bar{z},x$	(35) $\bar{y},z,x$	(36) $y,z,\bar{x}$			
			(37) $\bar{y},\bar{x},z$	(38) y,x,z	(39) $\bar{y},x,\bar{z}$	(40) $y,\bar{x},\bar{z}$			
			(41) $\bar{x},\bar{z},y$	(42) $x,\bar{z},\bar{y}$	(43) x,z,y	(44) $\bar{x},z,\bar{y}$			
			(45) $\bar{z},\bar{y},x$	(46) $\bar{z},y,\bar{x}$	(47) $z,\bar{y},\bar{x}$	(48) z,y,x			
									Special: as above, plus
96	k	$..m$	x,x,z	$\bar{x},\bar{x},z$	$\bar{x},x,\bar{z}$	$x,\bar{x},\bar{z}$	z,x,x	$z,\bar{x},\bar{x}$	no extra conditions
			$\bar{z},\bar{x},x$	$\bar{z},x,\bar{x}$	x,z,x	$\bar{x},z,\bar{x}$	$x,\bar{z},\bar{x}$	$\bar{x},\bar{z},x$	
			$x,x,\bar{z}$	$\bar{x},\bar{x},\bar{z}$	$x,\bar{x},z$	$\bar{x},x,z$	$x,z,\bar{x}$	$\bar{x},z,x$	
			$\bar{x},\bar{z},\bar{x}$	$x,\bar{z},x$	$z,x,\bar{x}$	$z,\bar{x},x$	$\bar{z},x,x$	$\bar{z},\bar{x},\bar{x}$	
96	j	$m..$	$0,y,z$	$0,\bar{y},z$	$0,y,\bar{z}$	$0,\bar{y},\bar{z}$	$z,0,y$	$z,0,\bar{y}$	no extra conditions
			$\bar{z},0,y$	$\bar{z},0,\bar{y}$	$y,z,0$	$\bar{y},z,0$	$y,\bar{z},0$	$\bar{y},\bar{z},0$	
			$y,0,\bar{z}$	$\bar{y},0,\bar{z}$	$y,0,z$	$\bar{y},0,z$	$0,z,\bar{y}$	$0,z,y$	
			$0,\bar{z},\bar{y}$	$0,\bar{z},y$	$z,y,0$	$z,\bar{y},0$	$\bar{z},y,0$	$\bar{z},\bar{y},0$	
48	i	$m.m2$	$\frac{1}{2},y,y$	$\frac{1}{2},\bar{y},y$	$\frac{1}{2},y,\bar{y}$	$\frac{1}{2},\bar{y},\bar{y}$	$y,\frac{1}{2},y$	$y,\frac{1}{2},\bar{y}$	no extra conditions
			$\bar{y},\frac{1}{2},y$	$\bar{y},\frac{1}{2},\bar{y}$	$y,y,\frac{1}{2}$	$\bar{y},y,\frac{1}{2}$	$y,\bar{y},\frac{1}{2}$	$\bar{y},\bar{y},\frac{1}{2}$	
48	h	$m.m2$	$0,y,y$	$0,\bar{y},y$	$0,y,\bar{y}$	$0,\bar{y},\bar{y}$	$y,0,y$	$y,0,\bar{y}$	no extra conditions
			$\bar{y},0,y$	$\bar{y},0,\bar{y}$	$y,y,0$	$\bar{y},y,0$	$y,\bar{y},0$	$\bar{y},\bar{y},0$	
48	g	$2.mm$	$x,\frac{1}{4},\frac{1}{4}$	$\bar{x},\frac{3}{4},\frac{1}{4}$	$\frac{1}{4},x,\frac{1}{4}$	$\frac{1}{4},\bar{x},\frac{3}{4}$	$\frac{1}{4},\frac{1}{4},x$	$\frac{3}{4},\frac{1}{4},\bar{x}$	hkl : $h=2n$
			$\frac{1}{4},x,\frac{3}{4}$	$\frac{3}{4},\bar{x},\frac{3}{4}$	$x,\frac{1}{4},\frac{3}{4}$	$\bar{x},\frac{1}{4},\frac{1}{4}$	$\frac{1}{4},\frac{1}{4},\bar{x}$	$\frac{1}{4},\frac{3}{4},x$	
32	f	$.3m$	x,x,x	$\bar{x},\bar{x},x$	$\bar{x},x,\bar{x}$	$x,\bar{x},\bar{x}$			no extra conditions
			$x,x,\bar{x}$	$\bar{x},\bar{x},\bar{x}$	$x,\bar{x},x$	$\bar{x},x,x$			
24	e	$4m.m$	$x,0,0$	$\bar{x},0,0$	$0,x,0$	$0,\bar{x},0$	$0,0,x$	$0,0,\bar{x}$	no extra conditions
24	d	$m.mm$	$0,\frac{1}{4},\frac{1}{4}$	$0,\frac{3}{4},\frac{1}{4}$	$\frac{1}{4},0,\frac{1}{4}$	$\frac{1}{4},0,\frac{3}{4}$	$\frac{1}{4},\frac{1}{4},0$	$\frac{3}{4},\frac{1}{4},0$	hkl : $h=2n$
8	c	$\bar{4}3m$	$\frac{1}{4},\frac{1}{4},\frac{1}{4}$	$\frac{1}{4},\frac{1}{4},\frac{3}{4}$					hkl : $h=2n$
4	b	$m\bar{3}m$	$\frac{1}{2},\frac{1}{2},\frac{1}{2}$						no extra conditions
4	a	$m\bar{3}m$	$0,0,0$						no extra conditions

Symmetry of special projections

Along [001] $p4mm$
$\mathbf{a}'=\frac{1}{2}\mathbf{a}$ $\mathbf{b}'=\frac{1}{2}\mathbf{b}$
Origin at $0,0,z$

Along [111] $p6mm$
$\mathbf{a}'=\frac{1}{6}(2\mathbf{a}-\mathbf{b}-\mathbf{c})$ $\mathbf{b}'=\frac{1}{6}(-\mathbf{a}+2\mathbf{b}-\mathbf{c})$
Origin at x,x,x

Along [110] $c2mm$
$\mathbf{a}'=\frac{1}{2}(-\mathbf{a}+\mathbf{b})$ $\mathbf{b}'=\mathbf{c}$
Origin at $x,x,0$

Maximal non-isomorphic subgroups

I	[2] $F\,\bar{4}\,3\,m$ (216)	(1; 2; 3; 4; 5; 6; 7; 8; 9; 10; 11; 12; 37; 38; 39; 40; 41; 42; 43; 44; 45; 46; 47; 48)+
	[2] $F\,4\,3\,2$ (209)	(1; 2; 3; 4; 5; 6; 7; 8; 9; 10; 11; 12; 13; 14; 15; 16; 17; 18; 19; 20; 21; 22; 23; 24)+
	[2] $F\,m\,\bar{3}\,1$ ($F\,m\,\bar{3}$, 202)	(1; 2; 3; 4; 5; 6; 7; 8; 9; 10; 11; 12; 25; 26; 27; 28; 29; 30; 31; 32; 33; 34; 35; 36)+
	[3] $F\,4/m\,1\,2/m$ ($I\,4/m\,m\,m$, 139)	(1; 2; 3; 4; 13; 14; 15; 16; 25; 26; 27; 28; 37; 38; 39; 40)+
	[3] $F\,4/m\,1\,2/m$ ($I\,4/m\,m\,m$, 139)	(1; 2; 3; 4; 17; 18; 19; 20; 25; 26; 27; 28; 41; 42; 43; 44)+
	[3] $F\,4/m\,1\,2/m$ ($I\,4/m\,m\,m$, 139)	(1; 2; 3; 4; 21; 22; 23; 24; 25; 26; 27; 28; 45; 46; 47; 48)+
	[4] $F\,1\,\bar{3}\,2/m$ ($R\,\bar{3}\,m$, 166)	(1; 5; 9; 14; 19; 24; 25; 29; 33; 38; 43; 48)+
	[4] $F\,1\,\bar{3}\,2/m$ ($R\,\bar{3}\,m$, 166)	(1; 6; 12; 13; 18; 24; 25; 30; 36; 37; 42; 48)+
	[4] $F\,1\,\bar{3}\,2/m$ ($R\,\bar{3}\,m$, 166)	(1; 7; 10; 13; 19; 22; 25; 31; 34; 37; 43; 46)+
	[4] $F\,1\,\bar{3}\,2/m$ ($R\,\bar{3}\,m$, 166)	(1; 8; 11; 14; 18; 22; 25; 32; 35; 38; 42; 46)+
IIa	[4] $P\,n\,\bar{3}\,m$ (224)	1; 5; 9; 14; 19; 24; 25; 29; 33; 38; 43; 48; (4; 6; 11; 16; 18; 23; 28; 30; 35; 40; 42; 47) + $(0,\frac{1}{2},\frac{1}{2})$; (3; 8; 10; 15; 20; 22; 27; 32; 34; 39; 44; 46) + $(\frac{1}{2},0,\frac{1}{2})$; (2; 7; 12; 13; 17; 21; 26; 31; 36; 37; 41; 45) + $(\frac{1}{2},\frac{1}{2},0)$
	[4] $P\,n\,\bar{3}\,m$ (224)	1; 6; 12; 13; 18; 24; 25; 30; 36; 37; 42; 48; (4; 5; 10; 15; 19; 23; 28; 29; 34; 39; 43; 47) + $(0,\frac{1}{2},\frac{1}{2})$; (3; 7; 11; 16; 17; 22; 27; 31; 35; 40; 41; 46) + $(\frac{1}{2},0,\frac{1}{2})$; (2; 8; 9; 14; 20; 21; 26; 32; 33; 38; 44; 45) + $(\frac{1}{2},\frac{1}{2},0)$
	[4] $P\,n\,\bar{3}\,m$ (224)	1; 7; 10; 13; 19; 22; 25; 31; 34; 37; 43; 46; (4; 8; 12; 15; 18; 21; 28; 32; 36; 39; 42; 45) + $(0,\frac{1}{2},\frac{1}{2})$; (3; 6; 9; 16; 20; 24; 27; 30; 33; 40; 44; 48) + $(\frac{1}{2},0,\frac{1}{2})$; (2; 5; 11; 14; 17; 23; 26; 29; 35; 38; 41; 47) + $(\frac{1}{2},\frac{1}{2},0)$
	[4] $P\,n\,\bar{3}\,m$ (224)	1; 8; 11; 14; 18; 22; 25; 32; 35; 38; 42; 46; (4; 7; 9; 16; 19; 21; 28; 31; 33; 40; 43; 45) + $(0,\frac{1}{2},\frac{1}{2})$; (3; 5; 12; 15; 17; 24; 27; 29; 36; 39; 41; 48) + $(\frac{1}{2},0,\frac{1}{2})$; (2; 6; 10; 13; 20; 23; 26; 30; 34; 37; 44; 47) + $(\frac{1}{2},\frac{1}{2},0)$
	[4] $P\,m\,\bar{3}\,m$ (221)	1; 2; 3; 4; 5; 6; 7; 8; 9; 10; 11; 12; 13; 14; 15; 16; 17; 18; 19; 20; 21; 22; 23; 24; 25; 26; 27; 28; 29; 30; 31; 32; 33; 34; 35; 36; 37; 38; 39; 40; 41; 42; 43; 44; 45; 46; 47; 48
	[4] $P\,m\,\bar{3}\,m$ (221)	1; 2; 3; 4; 13; 14; 15; 16; 25; 26; 27; 28; 37; 38; 39; 40; (9; 10; 11; 12; 17; 18; 19; 20; 33; 34; 35; 36; 41; 42; 43; 44) + $(0,\frac{1}{2},\frac{1}{2})$; (5; 6; 7; 8; 21; 22; 23; 24; 29; 30; 31; 32; 45; 46; 47; 48) + $(\frac{1}{2},0,\frac{1}{2})$
	[4] $P\,m\,\bar{3}\,m$ (221)	1; 2; 3; 4; 17; 18; 19; 20; 25; 26; 27; 28; 41; 42; 43; 44; (9; 10; 11; 12; 21; 22; 23; 24; 33; 34; 35; 36; 45; 46; 47; 48) + $(\frac{1}{2},0,\frac{1}{2})$; (5; 6; 7; 8; 13; 14; 15; 16; 29; 30; 31; 32; 37; 38; 39; 40) + $(\frac{1}{2},\frac{1}{2},0)$
	[4] $P\,m\,\bar{3}\,m$ (221)	1; 2; 3; 4; 21; 22; 23; 24; 25; 26; 27; 28; 45; 46; 47; 48; (5; 6; 7; 8; 17; 18; 19; 20; 29; 30; 31; 32; 41; 42; 43; 44) + $(0,\frac{1}{2},\frac{1}{2})$; (9; 10; 11; 12; 13; 14; 15; 16; 33; 34; 35; 36; 37; 38; 39; 40) + $(\frac{1}{2},\frac{1}{2},0)$
IIb	none	

Maximal isomorphic subgroups of lowest index

IIc [27] $F\,m\,\bar{3}\,m$ ($\mathbf{a}' = 3\mathbf{a}, \mathbf{b}' = 3\mathbf{b}, \mathbf{c}' = 3\mathbf{c}$) (225)

Minimal non-isomorphic supergroups

I none

II [2] $P\,m\,\bar{3}\,m$ ($\mathbf{a}' = \frac{1}{2}\mathbf{a}, \mathbf{b}' = \frac{1}{2}\mathbf{b}, \mathbf{c}' = \frac{1}{2}\mathbf{c}$) (221)

Symmetry operations

For $(0,0,0)+$ set

(1) 1	(2) $2\ \ 0,0,z$	(3) $2\ \ 0,y,0$	(4) $2\ \ x,0,0$
(5) $3^{+}\ \ x,x,x$	(6) $3^{+}\ \ \bar{x},x,\bar{x}$	(7) $3^{+}\ \ x,\bar{x},\bar{x}$	(8) $3^{+}\ \ \bar{x},\bar{x},x$
(9) $3^{-}\ \ x,x,x$	(10) $3^{-}\ \ x,\bar{x},\bar{x}$	(11) $3^{-}\ \ \bar{x},\bar{x},x$	(12) $3^{-}\ \ \bar{x},x,\bar{x}$
(13) $2\ \ x,x,0$	(14) $2\ \ x,\bar{x},0$	(15) $4^{-}\ \ 0,0,z$	(16) $4^{+}\ \ 0,0,z$
(17) $4^{-}\ \ x,0,0$	(18) $2\ \ 0,y,y$	(19) $2\ \ 0,y,\bar{y}$	(20) $4^{+}\ \ x,0,0$
(21) $4^{+}\ \ 0,y,0$	(22) $2\ \ x,0,x$	(23) $4^{-}\ \ 0,y,0$	(24) $2\ \ \bar{x},0,x$
(25) $\bar{1}\ \ 0,0,0$	(26) $m\ \ x,y,0$	(27) $m\ \ x,0,z$	(28) $m\ \ 0,y,z$
(29) $\bar{3}^{+}\ \ x,x,x;\ 0,0,0$	(30) $\bar{3}^{+}\ \ \bar{x},x,\bar{x};\ 0,0,0$	(31) $\bar{3}^{+}\ \ x,\bar{x},\bar{x};\ 0,0,0$	(32) $\bar{3}^{+}\ \ \bar{x},\bar{x},x;\ 0,0,0$
(33) $\bar{3}^{-}\ \ x,x,x;\ 0,0,0$	(34) $\bar{3}^{-}\ \ x,\bar{x},\bar{x};\ 0,0,0$	(35) $\bar{3}^{-}\ \ \bar{x},\bar{x},x;\ 0,0,0$	(36) $\bar{3}^{-}\ \ \bar{x},x,\bar{x};\ 0,0,0$
(37) $m\ \ x,\bar{x},z$	(38) $m\ \ x,x,z$	(39) $\bar{4}^{-}\ \ 0,0,z;\ 0,0,0$	(40) $\bar{4}^{+}\ \ 0,0,z;\ 0,0,0$
(41) $\bar{4}^{-}\ \ x,0,0;\ 0,0,0$	(42) $m\ \ x,y,\bar{y}$	(43) $m\ \ x,y,y$	(44) $\bar{4}^{+}\ \ x,0,0;\ 0,0,0$
(45) $\bar{4}^{+}\ \ 0,y,0;\ 0,0,0$	(46) $m\ \ \bar{x},y,x$	(47) $\bar{4}^{-}\ \ 0,y,0;\ 0,0,0$	(48) $m\ \ x,y,x$

For $(0,\frac{1}{2},\frac{1}{2})+$ set

(1) $t(0,\frac{1}{2},\frac{1}{2})$	(2) $2(0,0,\frac{1}{2})\ \ 0,\frac{1}{4},z$	(3) $2(0,\frac{1}{2},0)\ \ 0,y,\frac{1}{4}$	(4) $2\ \ x,\frac{1}{4},\frac{1}{4}$
(5) $3^{+}(\frac{1}{3},\frac{1}{3},\frac{1}{3})\ \ x-\frac{1}{3},x-\frac{1}{6},x$	(6) $3^{+}\ \ \bar{x},x+\frac{1}{2},\bar{x}$	(7) $3^{+}(-\frac{1}{3},\frac{1}{3},\frac{1}{3})\ \ x+\frac{1}{3},\bar{x}-\frac{1}{6},\bar{x}$	(8) $3^{+}\ \ \bar{x},\bar{x}+\frac{1}{2},x$
(9) $3^{-}(\frac{1}{3},\frac{1}{3},\frac{1}{3})\ \ x-\frac{1}{6},x+\frac{1}{6},x$	(10) $3^{-}(-\frac{1}{3},\frac{1}{3},\frac{1}{3})\ \ x+\frac{1}{6},\bar{x}+\frac{1}{6},\bar{x}$	(11) $3^{-}\ \ \bar{x}+\frac{1}{2},\bar{x}+\frac{1}{2},x$	(12) $3^{-}\ \ \bar{x}-\frac{1}{2},x+\frac{1}{2},\bar{x}$
(13) $2(\frac{1}{4},\frac{1}{4},0)\ \ x,x+\frac{1}{4},\frac{1}{4}$	(14) $2(-\frac{1}{4},\frac{1}{4},0)\ \ x,\bar{x}+\frac{1}{4},\frac{1}{4}$	(15) $4^{-}(0,0,\frac{1}{2})\ \ \frac{1}{4},\frac{1}{4},z$	(16) $4^{+}(0,0,\frac{1}{2})\ \ -\frac{1}{4},\frac{1}{4},z$
(17) $4^{-}\ \ x,\frac{1}{2},0$	(18) $2(0,\frac{1}{2},\frac{1}{2})\ \ 0,y,y$	(19) $2\ \ 0,y+\frac{1}{2},\bar{y}$	(20) $4^{+}\ \ x,0,\frac{1}{2}$
(21) $4^{+}(0,\frac{1}{2},0)\ \ \frac{1}{4},y,\frac{1}{4}$	(22) $2(\frac{1}{4},0,\frac{1}{4})\ \ x-\frac{1}{4},\frac{1}{4},x$	(23) $4^{-}(0,\frac{1}{2},0)\ \ -\frac{1}{4},y,\frac{1}{4}$	(24) $2(-\frac{1}{4},0,\frac{1}{4})\ \ \bar{x}+\frac{1}{4},\frac{1}{4},x$
(25) $\bar{1}\ \ 0,\frac{1}{4},\frac{1}{4}$	(26) $b\ \ x,y,\frac{1}{4}$	(27) $c\ \ x,\frac{1}{4},z$	(28) $n(0,\frac{1}{2},\frac{1}{2})\ \ 0,y,z$
(29) $\bar{3}^{+}\ \ x,x+\frac{1}{2},x;\ 0,\frac{1}{2},0$	(30) $\bar{3}^{+}\ \ \bar{x}-1,x+\frac{1}{2},\bar{x};\ -\frac{1}{2},0,\frac{1}{2}$	(31) $\bar{3}^{+}\ \ x,\bar{x}+\frac{1}{2},\bar{x};\ 0,\frac{1}{2},0$	(32) $\bar{3}^{+}\ \ \bar{x}+1,\bar{x}+\frac{1}{2},x;\ \frac{1}{2},0,\frac{1}{2}$
(33) $\bar{3}^{-}\ \ x-\frac{1}{2},x-\frac{1}{2},x;\ 0,0,\frac{1}{2}$	(34) $\bar{3}^{-}\ \ x+\frac{1}{2},\bar{x}-\frac{1}{2},\bar{x};\ 0,0,\frac{1}{2}$	(35) $\bar{3}^{-}\ \ \bar{x}-\frac{1}{2},\bar{x}+\frac{1}{2},x;\ -\frac{1}{2},\frac{1}{2},0$	(36) $\bar{3}^{-}\ \ \bar{x}+\frac{1}{2},x+\frac{1}{2},\bar{x};\ \frac{1}{2},\frac{1}{2},0$
(37) $g(-\frac{1}{4},\frac{1}{4},\frac{1}{2})\ \ x+\frac{1}{4},\bar{x},z$	(38) $g(\frac{1}{4},\frac{1}{4},\frac{1}{2})\ \ x-\frac{1}{4},x,z$	(39) $\bar{4}^{-}\ \ -\frac{1}{4},\frac{1}{4},z;\ -\frac{1}{4},\frac{1}{4},\frac{1}{4}$	(40) $\bar{4}^{+}\ \ \frac{1}{4},\frac{1}{4},z;\ \frac{1}{4},\frac{1}{4},\frac{1}{4}$
(41) $\bar{4}^{-}\ \ x,0,\frac{1}{2};\ 0,0,\frac{1}{2}$	(42) $m\ \ x,y+\frac{1}{2},\bar{y}$	(43) $g(0,\frac{1}{2},\frac{1}{2})\ \ x,y,y$	(44) $\bar{4}^{+}\ \ x,\frac{1}{2},0;\ 0,\frac{1}{2},0$
(45) $\bar{4}^{+}\ \ -\frac{1}{4},y,\frac{1}{4};\ -\frac{1}{4},\frac{1}{4},\frac{1}{4}$	(46) $g(-\frac{1}{4},\frac{1}{2},\frac{1}{4})\ \ \bar{x}+\frac{1}{4},y,x$	(47) $\bar{4}^{-}\ \ \frac{1}{4},y,\frac{1}{4};\ \frac{1}{4},\frac{1}{4},\frac{1}{4}$	(48) $g(\frac{1}{4},\frac{1}{2},\frac{1}{4})\ \ x-\frac{1}{4},y,x$

For $(\frac{1}{2},0,\frac{1}{2})+$ set

(1) $t(\frac{1}{2},0,\frac{1}{2})$	(2) $2(0,0,\frac{1}{2})\ \ \frac{1}{4},0,z$	(3) $2\ \ \frac{1}{4},y,\frac{1}{4}$	(4) $2(\frac{1}{2},0,0)\ \ x,0,\frac{1}{4}$
(5) $3^{+}(\frac{1}{3},\frac{1}{3},\frac{1}{3})\ \ x+\frac{1}{6},x-\frac{1}{6},x$	(6) $3^{+}(\frac{1}{3},-\frac{1}{3},\frac{1}{3})\ \ \bar{x}+\frac{1}{6},x+\frac{1}{6},\bar{x}$	(7) $3^{+}\ \ x+\frac{1}{2},\bar{x}-\frac{1}{2},\bar{x}$	(8) $3^{+}\ \ \bar{x}+\frac{1}{2},\bar{x}+\frac{1}{2},x$
(9) $3^{-}(\frac{1}{3},\frac{1}{3},\frac{1}{3})\ \ x-\frac{1}{6},x-\frac{1}{3},x$	(10) $3^{-}\ \ x+\frac{1}{2},\bar{x},\bar{x}$	(11) $3^{-}\ \ \bar{x}+\frac{1}{2},\bar{x},x$	(12) $3^{-}(\frac{1}{3},-\frac{1}{3},\frac{1}{3})\ \ \bar{x}-\frac{1}{6},x+\frac{1}{3},\bar{x}$
(13) $2(\frac{1}{4},\frac{1}{4},0)\ \ x,x-\frac{1}{4},\frac{1}{4}$	(14) $2(\frac{1}{4},-\frac{1}{4},0)\ \ x,\bar{x}+\frac{1}{4},\frac{1}{4}$	(15) $4^{-}(0,0,\frac{1}{2})\ \ \frac{1}{4},-\frac{1}{4},z$	(16) $4^{+}(0,0,\frac{1}{2})\ \ \frac{1}{4},\frac{1}{4},z$
(17) $4^{-}(\frac{1}{2},0,0)\ \ x,\frac{1}{4},\frac{1}{4}$	(18) $2(0,\frac{1}{4},\frac{1}{4})\ \ \frac{1}{4},y-\frac{1}{4},y$	(19) $2(0,-\frac{1}{4},\frac{1}{4})\ \ \frac{1}{4},y+\frac{1}{4},\bar{y}$	(20) $4^{+}(\frac{1}{2},0,0)\ \ x,-\frac{1}{4},\frac{1}{4}$
(21) $4^{+}\ \ \frac{1}{2},y,0$	(22) $2(\frac{1}{2},0,\frac{1}{2})\ \ x,0,x$	(23) $4^{-}\ \ 0,y,\frac{1}{2}$	(24) $2\ \ \bar{x}+\frac{1}{2},0,x$
(25) $\bar{1}\ \ \frac{1}{4},0,\frac{1}{4}$	(26) $a\ \ x,y,\frac{1}{4}$	(27) $n(\frac{1}{2},0,\frac{1}{2})\ \ x,0,z$	(28) $c\ \ \frac{1}{4},y,z$
(29) $\bar{3}^{+}\ \ x-\frac{1}{2},x-\frac{1}{2},x;\ 0,0,\frac{1}{2}$	(30) $\bar{3}^{+}\ \ \bar{x}-\frac{1}{2},x+\frac{1}{2},\bar{x};\ 0,0,\frac{1}{2}$	(31) $\bar{3}^{+}\ \ x+\frac{1}{2},\bar{x}+\frac{1}{2},\bar{x};\ \frac{1}{2},\frac{1}{2},0$	(32) $\bar{3}^{+}\ \ \bar{x}+\frac{1}{2},\bar{x}-\frac{1}{2},x;\ \frac{1}{2},-\frac{1}{2},0$
(33) $\bar{3}^{-}\ \ x+\frac{1}{2},x,x;\ \frac{1}{2},0,0$	(34) $\bar{3}^{-}\ \ x+\frac{1}{2},\bar{x}-1,\bar{x};\ 0,-\frac{1}{2},\frac{1}{2}$	(35) $\bar{3}^{-}\ \ \bar{x}+\frac{1}{2},\bar{x}+1,x;\ 0,\frac{1}{2},\frac{1}{2}$	(36) $\bar{3}^{-}\ \ \bar{x}+\frac{1}{2},x,\bar{x};\ \frac{1}{2},0,0$
(37) $g(\frac{1}{4},-\frac{1}{4},\frac{1}{2})\ \ x+\frac{1}{4},\bar{x},z$	(38) $g(\frac{1}{4},\frac{1}{4},\frac{1}{2})\ \ x+\frac{1}{4},x,z$	(39) $\bar{4}^{-}\ \ \frac{1}{4},\frac{1}{4},z;\ \frac{1}{4},\frac{1}{4},\frac{1}{4}$	(40) $\bar{4}^{+}\ \ \frac{1}{4},-\frac{1}{4},z;\ \frac{1}{4},-\frac{1}{4},\frac{1}{4}$
(41) $\bar{4}^{-}\ \ x,-\frac{1}{4},\frac{1}{4};\ \frac{1}{4},-\frac{1}{4},\frac{1}{4}$	(42) $g(\frac{1}{2},-\frac{1}{4},\frac{1}{4})\ \ x,y+\frac{1}{4},\bar{y}$	(43) $g(\frac{1}{2},\frac{1}{4},\frac{1}{4})\ \ x,y-\frac{1}{4},y$	(44) $\bar{4}^{+}\ \ x,\frac{1}{4},\frac{1}{4};\ \frac{1}{4},\frac{1}{4},\frac{1}{4}$
(45) $\bar{4}^{+}\ \ 0,y,\frac{1}{2};\ 0,0,\frac{1}{2}$	(46) $m\ \ \bar{x}+\frac{1}{2},y,x$	(47) $\bar{4}^{-}\ \ \frac{1}{2},y,0;\ \frac{1}{2},0,0$	(48) $g(\frac{1}{2},0,\frac{1}{2})\ \ x,y,x$

For $(\frac{1}{2},\frac{1}{2},0)+$ set

(1) $t(\frac{1}{2},\frac{1}{2},0)$	(2) $2\ \ \frac{1}{4},\frac{1}{4},z$	(3) $2(0,\frac{1}{2},0)\ \ \frac{1}{4},y,0$	(4) $2(\frac{1}{2},0,0)\ \ x,\frac{1}{4},0$
(5) $3^{+}(\frac{1}{3},\frac{1}{3},\frac{1}{3})\ \ x+\frac{1}{6},x+\frac{1}{3},x$	(6) $3^{+}\ \ \bar{x}+\frac{1}{2},x,\bar{x}$	(7) $3^{+}\ \ x+\frac{1}{2},\bar{x},\bar{x}$	(8) $3^{+}(\frac{1}{3},\frac{1}{3},-\frac{1}{3})\ \ \bar{x}+\frac{1}{6},\bar{x}+\frac{1}{3},x$
(9) $3^{-}(\frac{1}{3},\frac{1}{3},\frac{1}{3})\ \ x+\frac{1}{3},x+\frac{1}{6},x$	(10) $3^{-}\ \ x,\bar{x}+\frac{1}{2},\bar{x}$	(11) $3^{-}(\frac{1}{3},\frac{1}{3},-\frac{1}{3})\ \ \bar{x}+\frac{1}{3},\bar{x}+\frac{1}{6},x$	(12) $3^{-}\ \ \bar{x},x+\frac{1}{2},\bar{x}$
(13) $2(\frac{1}{2},\frac{1}{2},0)\ \ x,x,0$	(14) $2\ \ x,\bar{x}+\frac{1}{2},0$	(15) $4^{-}\ \ \frac{1}{2},0,z$	(16) $4^{+}\ \ 0,\frac{1}{2},z$
(17) $4^{-}(\frac{1}{2},0,0)\ \ x,\frac{1}{4},-\frac{1}{4}$	(18) $2(0,\frac{1}{4},\frac{1}{4})\ \ \frac{1}{4},y+\frac{1}{4},y$	(19) $2(0,\frac{1}{4},-\frac{1}{4})\ \ \frac{1}{4},y+\frac{1}{4},\bar{y}$	(20) $4^{+}(\frac{1}{2},0,0)\ \ x,\frac{1}{4},\frac{1}{4}$
(21) $4^{+}(0,\frac{1}{2},0)\ \ \frac{1}{4},y,-\frac{1}{4}$	(22) $2(\frac{1}{4},0,\frac{1}{4})\ \ x+\frac{1}{4},\frac{1}{4},x$	(23) $4^{-}(0,\frac{1}{2},0)\ \ \frac{1}{4},y,\frac{1}{4}$	(24) $2(\frac{1}{4},0,-\frac{1}{4})\ \ \bar{x}+\frac{1}{4},\frac{1}{4},x$
(25) $\bar{1}\ \ \frac{1}{4},\frac{1}{4},0$	(26) $n(\frac{1}{2},\frac{1}{2},0)\ \ x,y,0$	(27) $a\ \ x,\frac{1}{4},z$	(28) $b\ \ \frac{1}{4},y,z$
(29) $\bar{3}^{+}\ \ x+\frac{1}{2},x,x;\ \frac{1}{2},0,0$	(30) $\bar{3}^{+}\ \ \bar{x}-\frac{1}{2},x+1,\bar{x};\ 0,\frac{1}{2},\frac{1}{2}$	(31) $\bar{3}^{+}\ \ x-\frac{1}{2},\bar{x}+1,\bar{x};\ 0,\frac{1}{2},-\frac{1}{2}$	(32) $\bar{3}^{+}\ \ \bar{x}+\frac{1}{2},\bar{x},x;\ \frac{1}{2},0,0$
(33) $\bar{3}^{-}\ \ x,x+\frac{1}{2},x;\ 0,\frac{1}{2},0$	(34) $\bar{3}^{-}\ \ x+1,\bar{x}-\frac{1}{2},\bar{x};\ \frac{1}{2},0,\frac{1}{2}$	(35) $\bar{3}^{-}\ \ \bar{x},\bar{x}+\frac{1}{2},x;\ 0,\frac{1}{2},0$	(36) $\bar{3}^{-}\ \ \bar{x}+1,x-\frac{1}{2},\bar{x};\ \frac{1}{2},0,-\frac{1}{2}$
(37) $m\ \ x+\frac{1}{2},\bar{x},z$	(38) $g(\frac{1}{2},\frac{1}{2},0)\ \ x,x,z$	(39) $\bar{4}^{-}\ \ 0,\frac{1}{2},z;\ 0,\frac{1}{2},0$	(40) $\bar{4}^{+}\ \ \frac{1}{2},0,z;\ \frac{1}{2},0,0$
(41) $\bar{4}^{-}\ \ x,\frac{1}{4},\frac{1}{4};\ \frac{1}{4},\frac{1}{4},\frac{1}{4}$	(42) $g(\frac{1}{2},\frac{1}{4},-\frac{1}{4})\ \ x,y+\frac{1}{4},\bar{y}$	(43) $g(\frac{1}{2},\frac{1}{4},\frac{1}{4})\ \ x,y+\frac{1}{4},y$	(44) $\bar{4}^{+}\ \ x,\frac{1}{4},-\frac{1}{4};\ \frac{1}{4},\frac{1}{4},-\frac{1}{4}$
(45) $\bar{4}^{+}\ \ \frac{1}{4},y,\frac{1}{4};\ \frac{1}{4},\frac{1}{4},\frac{1}{4}$	(46) $g(\frac{1}{4},\frac{1}{2},-\frac{1}{4})\ \ \bar{x}+\frac{1}{4},y,x$	(47) $\bar{4}^{-}\ \ \frac{1}{4},y,-\frac{1}{4};\ \frac{1}{4},\frac{1}{4},-\frac{1}{4}$	(48) $g(\frac{1}{4},\frac{1}{2},\frac{1}{4})\ \ x+\frac{1}{4},y,x$