

C_2^2
 $P12_11$

No. 4

 $P2_1$

 UNIQUE AXIS b
Generators selected (1); $t(1,0,0)$; $t(0,1,0)$; $t(0,0,1)$; (2)

General position

 Multiplicity,
 Wyckoff letter,
 Site symmetry

Coordinates

 2 a 1

 (1) x, y, z (2) $\bar{x}, y + \frac{1}{2}, \bar{z}$
I Maximal translationengleiche subgroups

 [2] $P1$ (1) 1

II Maximal klassengleiche subgroups

• Enlarged unit cell

[2] $\mathbf{c}' = 2\mathbf{c}$			
$P12_11$ (4)	$\langle 2 \rangle$	$\mathbf{a}, \mathbf{b}, 2\mathbf{c}$	
$P12_11$ (4)	$\langle 2 + (0, 0, 1) \rangle$	$\mathbf{a}, \mathbf{b}, 2\mathbf{c}$	0, 0, 1/2
[2] $\mathbf{a}' = 2\mathbf{a}$			
$P12_11$ (4)	$\langle 2 \rangle$	$2\mathbf{a}, \mathbf{b}, \mathbf{c}$	
$P12_11$ (4)	$\langle 2 + (1, 0, 0) \rangle$	$2\mathbf{a}, \mathbf{b}, \mathbf{c}$	1/2, 0, 0
[2] $\mathbf{a}' = 2\mathbf{a}, \mathbf{c}' = 2\mathbf{c}$			
$B12_11$ (4, $P12_11$)	$\langle 2 \rangle$	$\mathbf{a} - \mathbf{c}, \mathbf{b}, 2\mathbf{c}$	
$B12_11$ (4, $P12_11$)	$\langle 2 + (0, 0, 1) \rangle$	$\mathbf{a} - \mathbf{c}, \mathbf{b}, 2\mathbf{c}$	0, 0, 1/2
[3] $\mathbf{b}' = 3\mathbf{b}$			
$P12_11$ (4)	$\langle 2 + (0, 1, 0) \rangle$	$\mathbf{a}, 3\mathbf{b}, \mathbf{c}$	
[3] $\mathbf{c}' = 3\mathbf{c}$			
$P12_11$ (4)	$\langle 2 \rangle$	$\mathbf{a}, \mathbf{b}, 3\mathbf{c}$	
$P12_11$ (4)	$\langle 2 + (0, 0, 2) \rangle$	$\mathbf{a}, \mathbf{b}, 3\mathbf{c}$	0, 0, 1
$P12_11$ (4)	$\langle 2 + (0, 0, 4) \rangle$	$\mathbf{a}, \mathbf{b}, 3\mathbf{c}$	0, 0, 2
[3] $\mathbf{a}' = \mathbf{a} - \mathbf{c}, \mathbf{c}' = 3\mathbf{c}$			
$P12_11$ (4)	$\langle 2 \rangle$	$\mathbf{a} - \mathbf{c}, \mathbf{b}, 3\mathbf{c}$	
$P12_11$ (4)	$\langle 2 + (0, 0, 2) \rangle$	$\mathbf{a} - \mathbf{c}, \mathbf{b}, 3\mathbf{c}$	0, 0, 1
$P12_11$ (4)	$\langle 2 + (0, 0, 4) \rangle$	$\mathbf{a} - \mathbf{c}, \mathbf{b}, 3\mathbf{c}$	0, 0, 2
[3] $\mathbf{a}' = \mathbf{a} - 2\mathbf{c}, \mathbf{c}' = 3\mathbf{c}$			
$P12_11$ (4)	$\langle 2 \rangle$	$\mathbf{a} - 2\mathbf{c}, \mathbf{b}, 3\mathbf{c}$	
$P12_11$ (4)	$\langle 2 + (0, 0, 2) \rangle$	$\mathbf{a} - 2\mathbf{c}, \mathbf{b}, 3\mathbf{c}$	0, 0, 1
$P12_11$ (4)	$\langle 2 + (0, 0, 4) \rangle$	$\mathbf{a} - 2\mathbf{c}, \mathbf{b}, 3\mathbf{c}$	0, 0, 2
[3] $\mathbf{a}' = 3\mathbf{a}$			
$P12_11$ (4)	$\langle 2 \rangle$	$3\mathbf{a}, \mathbf{b}, \mathbf{c}$	
$P12_11$ (4)	$\langle 2 + (2, 0, 0) \rangle$	$3\mathbf{a}, \mathbf{b}, \mathbf{c}$	1, 0, 0
$P12_11$ (4)	$\langle 2 + (4, 0, 0) \rangle$	$3\mathbf{a}, \mathbf{b}, \mathbf{c}$	2, 0, 0

• Series of maximal isomorphic subgroups

[p] $\mathbf{b}' = p\mathbf{b}$			
$P12_11$ (4)	$\langle 2 + (0, \frac{p}{2} - \frac{1}{2}, 0) \rangle$	$\mathbf{a}, p\mathbf{b}, \mathbf{c}$	
	$p > 2$		
	no conjugate subgroups		
[p] $\mathbf{a}' = \mathbf{a} - q\mathbf{c}, \mathbf{c}' = p\mathbf{c}$			
$P12_11$ (4)	$\langle 2 + (0, 0, 2u) \rangle$	$\mathbf{a} - q\mathbf{c}, \mathbf{b}, p\mathbf{c}$	0, 0, u
	$p > 2; 0 \leq q < p; 0 \leq u < p$		
	p conjugate subgroups for each pair of q and prime p		
[p] $\mathbf{a}' = p\mathbf{a}$			
$P12_11$ (4)	$\langle 2 + (2u, 0, 0) \rangle$	$p\mathbf{a}, \mathbf{b}, \mathbf{c}$	$u, 0, 0$
	$p > 2; 0 \leq u < p$		
	p conjugate subgroups for the prime p		

I Minimal translationengleiche supergroups

 [2] $P12_1/m1$ (11); [2] $P12_1/c1$ (14); [2] $P222_1$ (17); [2] $P2_12_12$ (18); [2] $P2_12_12_1$ (19); [2] $C222_1$ (20); [2] $Pmc2_1$ (26); [2] $Pca2_1$ (29); [2] $Pmn2_1$ (31); [2] $Pna2_1$ (33); [2] $Cmc2_1$ (36); [2] $P4_1$ (76); [2] $P4_3$ (78); [3] $P6_1$ (169); [3] $P6_5$ (170); [3] $P6_3$ (173)

II Minimal non-isomorphic klassengleiche supergroups

• Additional centring translations

 [2] $C121$ (5); [2] $A121$ (5, $C121$); [2] $I121$ (5, $C121$)

• Decreased unit cell

 [2] $\mathbf{b}' = \frac{1}{2}\mathbf{b}$ $P121$ (3)

UNIQUE AXIS c

Generators selected (1); $t(1,0,0)$; $t(0,1,0)$; $t(0,0,1)$; (2)

General position

Multiplicity,
Wyckoff letter,
Site symmetry

Coordinates

2 a 1

(1) x,y,z (2) $\bar{x},\bar{y},z + \frac{1}{2}$

I Maximal translationengleiche subgroups

[2] $P1$ (1) 1

II Maximal klassengleiche subgroups

• **Enlarged unit cell**

[2] $\mathbf{a}' = 2\mathbf{a}$			
$P112_1$ (4)	$\langle 2 \rangle$	$2\mathbf{a}, \mathbf{b}, \mathbf{c}$	
$P112_1$ (4)	$\langle 2 + (1,0,0) \rangle$	$2\mathbf{a}, \mathbf{b}, \mathbf{c}$	$1/2, 0, 0$
[2] $\mathbf{b}' = 2\mathbf{b}$			
$P112_1$ (4)	$\langle 2 \rangle$	$\mathbf{a}, 2\mathbf{b}, \mathbf{c}$	
$P112_1$ (4)	$\langle 2 + (0,1,0) \rangle$	$\mathbf{a}, 2\mathbf{b}, \mathbf{c}$	$0, 1/2, 0$
[2] $\mathbf{a}' = 2\mathbf{a}, \mathbf{b}' = 2\mathbf{b}$			
$C112_1$ (4, $P112_1$)	$\langle 2 \rangle$	$2\mathbf{a}, -\mathbf{a} + \mathbf{b}, \mathbf{c}$	
$C112_1$ (4, $P112_1$)	$\langle 2 + (1,0,0) \rangle$	$2\mathbf{a}, -\mathbf{a} + \mathbf{b}, \mathbf{c}$	$1/2, 0, 0$
[3] $\mathbf{c}' = 3\mathbf{c}$			
$P112_1$ (4)	$\langle 2 + (0,0,1) \rangle$	$\mathbf{a}, \mathbf{b}, 3\mathbf{c}$	
[3] $\mathbf{a}' = 3\mathbf{a}$			
$P112_1$ (4)	$\langle 2 \rangle$	$3\mathbf{a}, \mathbf{b}, \mathbf{c}$	
$P112_1$ (4)	$\langle 2 + (2,0,0) \rangle$	$3\mathbf{a}, \mathbf{b}, \mathbf{c}$	$1, 0, 0$
$P112_1$ (4)	$\langle 2 + (4,0,0) \rangle$	$3\mathbf{a}, \mathbf{b}, \mathbf{c}$	$2, 0, 0$
[3] $\mathbf{a}' = 3\mathbf{a}, \mathbf{b}' = -\mathbf{a} + \mathbf{b}$			
$P112_1$ (4)	$\langle 2 \rangle$	$3\mathbf{a}, -\mathbf{a} + \mathbf{b}, \mathbf{c}$	
$P112_1$ (4)	$\langle 2 + (2,0,0) \rangle$	$3\mathbf{a}, -\mathbf{a} + \mathbf{b}, \mathbf{c}$	$1, 0, 0$
$P112_1$ (4)	$\langle 2 + (4,0,0) \rangle$	$3\mathbf{a}, -\mathbf{a} + \mathbf{b}, \mathbf{c}$	$2, 0, 0$
[3] $\mathbf{a}' = 3\mathbf{a}, \mathbf{b}' = -2\mathbf{a} + \mathbf{b}$			
$P112_1$ (4)	$\langle 2 \rangle$	$3\mathbf{a}, -2\mathbf{a} + \mathbf{b}, \mathbf{c}$	
$P112_1$ (4)	$\langle 2 + (2,0,0) \rangle$	$3\mathbf{a}, -2\mathbf{a} + \mathbf{b}, \mathbf{c}$	$1, 0, 0$
$P112_1$ (4)	$\langle 2 + (4,0,0) \rangle$	$3\mathbf{a}, -2\mathbf{a} + \mathbf{b}, \mathbf{c}$	$2, 0, 0$
[3] $\mathbf{b}' = 3\mathbf{b}$			
$P112_1$ (4)	$\langle 2 \rangle$	$\mathbf{a}, 3\mathbf{b}, \mathbf{c}$	
$P112_1$ (4)	$\langle 2 + (0,2,0) \rangle$	$\mathbf{a}, 3\mathbf{b}, \mathbf{c}$	$0, 1, 0$
$P112_1$ (4)	$\langle 2 + (0,4,0) \rangle$	$\mathbf{a}, 3\mathbf{b}, \mathbf{c}$	$0, 2, 0$

• **Series of maximal isomorphic subgroups**

[p] $\mathbf{c}' = p\mathbf{c}$			
$P112_1$ (4)	$\langle 2 + (0,0,\frac{p}{2} - \frac{1}{2}) \rangle$	$\mathbf{a}, \mathbf{b}, p\mathbf{c}$	
	$p > 2$		
	no conjugate subgroups		
[p] $\mathbf{a}' = p\mathbf{a}, \mathbf{b}' = -q\mathbf{a} + \mathbf{b}$			
$P112_1$ (4)	$\langle 2 + (2u,0,0) \rangle$	$p\mathbf{a}, -q\mathbf{a} + \mathbf{b}, \mathbf{c}$	$u, 0, 0$
	$p > 2; 0 \leq q < p; 0 \leq u < p$		
	p conjugate subgroups for each pair of q and prime p		
[p] $\mathbf{b}' = p\mathbf{b}$			
$P112_1$ (4)	$\langle 2 + (0,2u,0) \rangle$	$\mathbf{a}, p\mathbf{b}, \mathbf{c}$	$0, u, 0$
	$p > 2; 0 \leq u < p$		
	p conjugate subgroups for the prime p		

I Minimal translationengleiche supergroups

[2] $P112_1/m$ (11); [2] $P112_1/a$ (14); [2] $P222_1$ (17); [2] $P2_12_12$ (18); [2] $P2_12_12_1$ (19); [2] $C222_1$ (20); [2] $Pmc2_1$ (26); [2] $Pca2_1$ (29); [2] $Pmn2_1$ (31); [2] $Pna2_1$ (33); [2] $Cmc2_1$ (36); [2] $P4_1$ (76); [2] $P4_3$ (78); [3] $P6_1$ (169); [3] $P6_5$ (170); [3] $P6_3$ (173)

II Minimal non-isomorphic klassengleiche supergroups

• **Additional centring translations**

[2] $A112$ (5); [2] $B112$ (5, $A112$); [2] $I112$ (5, $A112$)

• **Decreased unit cell**

[2] $\mathbf{c}' = \frac{1}{2}\mathbf{c}$ $P112$ (3)