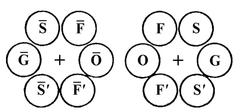
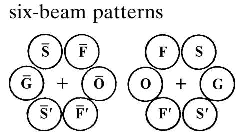
Table 2.5.3.5. *Symmetries of hexagonal six-beam CBED patterns for diffraction groups*

		Projection diffraction group										
		31_R		$3m1_R$						61_R		
Diffraction group		3	31_R	$3m_R$		$3m$		$3m1_R$		6	6_R	61_R
Two-dimensional symmetry		3	3	3		$3m$		$3m$		6	3	6
Three-dimensional symmetry			m'	$2'$				m', $(2')$			i	m', (i)
Zone-axis pattern	Bright-field pattern	3	6	$3m$		$3m$		$6mm$		6	3	6
	Whole-field pattern	3	3	3		$3m$		$3m$		6	3	6
Hexagonal six-beam pattern	O	1	1	1	m_2	1	m_v	m_2	m_v	1	1	1
	G	1	1_R	m_2	1	1	m_v	1_R	$1_R m_v (m_2)$	1	1	1_R
	F	1	1	m_2	1	1	1	1	m_2	1	1	1
	S	1	1	1	m_2	1	1	m_2	1	1	1	1
	FF'	1	3_R	1	1	1	m_v	3_R	$3_R m_v$	1	1	3_R
	SS'	1	1	1	1	1	m_v	1	m_v	1	6_R	6_R
A pair of symmetrical six-beam patterns 	$\pm O$	1	1_R	m_2	1	m_v	1	$m_v 1_R$	$1_R m_2$	2	1	$2(1_R)$
	$\pm G$	1	1	1	m_R	m_v	1	$m_v m_R$	1	2	2_R	21_R
	$\pm F$	1	1	1	1	m_v	1	m_v	1	1	6_R	6_R
	$\pm S$	1	3_R	1	1	m_v	1	$3_R m_v$	3_R	1	1	3_R
	$F'\bar{F}$	1	1	1	m_R	1	1	m_R	1	2	1	2
	$S'\bar{S}$	1	1	m_R	1	1	1	1	m_R	2	1	2
Point group		23, 3	$\bar{6}$	432, 32		$\bar{4}3m$, $3m$		$\bar{6}m2$		6	$m3$, 3	$6/m$

		Projection diffraction group				
		$6mm1_R$				
Diffraction group		$6m_R m_R$	$6mm$	$6_R mm_R$		$6mm1_R$
Two-dimensional symmetry		6	$6mm$	$3m$		$6mm$
Three-dimensional symmetry		$2'$		i, $(2')$		m', $(i, 2')$
Zone-axis pattern	Bright-field pattern	$6mm$	$6mm$	$3m$		$6mm$
	Whole-field pattern	6	$6mm$	$3m$		$6mm$
Hexagonal six-beam pattern	O	m_2	m_v	1	$m_v(m_2)$	$m_v(m_2)$
	G	m_2	m_v	m_2	m_v	$1_R m_v(m_2)$
	F	m_2	1	m_2	1	m_2
	S	m_2	1	1	m_2	m_2
	FF'	1	m_v	1	m_v	$3_R m_v$
	SS'	1	m_v	6_R	$6_R m_v$	$6_R m_v$
A pair of symmetrical six-beam patterns 	$\pm O$	$2m_2$	$2m_{v'}$	$m_v(m_2)$	1	$2(1_R)m_{v'}(m_2)$
	$\pm G$	$2m_R$	$2m_{v'}$	$2_R m_v$	$2_R m_R$	$21_R m_{v'}(m_R)$
	$\pm F$	1	$m_{v'}$	$6_R m_v$	6_R	$6_R m_{v'}$
	$\pm S$	1	$m_{v'}$	m_v	1	$3_R m_{v'}$
	$F'\bar{F}$	$2m_R$	2	1	m_R	$2m_R$
	$S'\bar{S}$	$2m_R$	2	m_R	1	$2m_R$
Point group		622	$6mm$	$m3m$, $\bar{3}m$		$6/mmm$

SMB pattern, and two-dimensional symmetry elements from a pair of SMB patterns, as shown in Tables 2.5.3.5, 2.5.3.6 and 2.5.3.7. Therefore, the use of a ZAP and SMB patterns is the most efficient way to find as many crystal symmetry elements in a specimen as possible.

2.5.3.3. *Space-group determination*

2.5.3.3.1. *Lattice-type determination*

When the point group of a specimen crystal is determined, the crystal axes may be found from a spot diffraction pattern recorded at a high-symmetry zone axis, using the orientations of the symmetry elements determined in the course of point-group determination. Integral-number indices are assigned to the spots of the diffraction patterns. The systematic absence of reflections indicates the lattice type of the crystal. It should be noted that reflections forbidden by the lattice type are always absent, even if dynamical diffraction takes place. (This is true for all sample thicknesses and accelerating voltages.) By comparing the experimentally obtained absences and the extinction rules known for the lattice types [P, C (A, B), I, F and R], a lattice type may be identified for the crystal concerned.

2.5.3.3.2. *Identification of screw axes and glide planes*

There are three space-group symmetry elements of diperiodic plane figures: (1) a horizontal screw axis $2_1'$, (2) a vertical glide plane g with a horizontal glide vector and (3) a horizontal glide plane g'. These are related to the point-group symmetry elements $2'$, m and m' of diperiodic plane figures, respectively. (It is noted that these symmetry elements and ten point-group symmetry elements form 80 space groups.)