

# spectroMEX crystals

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The MEX crystal spectrometer has a library comprising the following crystals:

- Si[1,1,1] x 5
- Si[2,2,0] x 1
- Si[4,0,0] x 1
- Si[4,2,2] x 1
- Si[3,3,1] x 1
- Si[6,2,0] x 1
- Si[5,3,1] x 1

This document provides tables outlining which emission lines are accessible via which bragg reflection of which cut. The document has two sections, the first comprises tables for each crystal cut; the second comprises tables for each element.

## Accessible emission lines by crystal cut

Si[1,1,1]

line	energy/eV	cut	bragg reflex.	bragg angle
Cr_Kb1	5946.8	1,1,1	3,3,3	85.84
Mn_Kb1	6491.8	1,1,1	3,3,3	66.01
Fe_Ka1	6405.2	1,1,1	3,3,3	67.82
Ni_Kb1	8266.8	1,1,1	4,4,4	73.06
Cu_Ka1	8046.3	1,1,1	4,4,4	79.37
Zn_Ka1	8637.2	1,1,1	4,4,4	66.29
Ga_Kb1	10267.0	1,1,1	5,5,5	74.33
Ge_Ka1	9886.0	1,1,1	5,5,5	89.27
As_Ka1	10543.4	1,1,1	5,5,5	69.65
Pm_Lb1	5961.0	1,1,1	3,3,3	84.26
Sm_Lb1	6201.1	1,1,1	3,3,3	73.03
Eu_Lb1	6458.4	1,1,1	3,3,3	66.69
Gd_La1	6053.4	1,1,1	3,3,3	78.46
Tb_La1	6272.9	1,1,1	3,3,3	71.00
Dy_La1	6498.0	1,1,1	3,3,3	65.89
Tm_Lb1	8102.0	1,1,1	4,4,4	77.44
Yb_Lb1	8402.0	1,1,1	4,4,4	70.26
Lu_Lb1	8710.0	1,1,1	4,4,4	65.22
Ta_La1	8146.0	1,1,1	4,4,4	76.12
W_La1	8398.0	1,1,1	4,4,4	70.33
Re_Lb1	10010.0	1,1,1	5,5,5	80.94
Re_La1	8652.0	1,1,1	4,4,4	66.07
Os_Lb1	10354.0	1,1,1	5,5,5	72.69
Ir_Lb1	10708.0	1,1,1	5,5,5	67.39
Hg_La1	9989.0	1,1,1	5,5,5	81.73
Tl_La1	10269.0	1,1,1	5,5,5	74.29
Pb_La1	10551.0	1,1,1	5,5,5	69.54
Bi_La1	10839.0	1,1,1	5,5,5	65.78

## Si[2,2,0]

line	energy/eV	cut	bragg reflex.	bragg angle
K_Ka1	3313.8	2,2,0	2,2,0	76.97
Mn_Kb1	6491.8	2,2,0	4,4,0	84.06
Fe_Kb1	7059.3	2,2,0	4,4,0	66.16
Co_Ka1	6930.9	2,2,0	4,4,0	68.69
Ga_Kb1	10267.0	2,2,0	6,6,0	70.62
Ge_Ka1	9886.0	2,2,0	6,6,0	78.44
As_Ka1	10543.4	2,2,0	6,6,0	66.73
Br_Kb1	13292.0	2,2,0	8,8,0	76.30
Cd_Lb1	3315.1	2,2,0	2,2,0	76.87
In_Lb1	3486.6	2,2,0	2,2,0	67.82
In_La1	3286.1	2,2,0	2,2,0	79.26
Sn_La1	3444.1	2,2,0	2,2,0	69.62
Eu_Lb1	6458.4	2,2,0	4,4,0	88.80
Gd_Lb1	6708.1	2,2,0	4,4,0	74.27
Tb_Lb1	6975.1	2,2,0	4,4,0	67.78
Dy_La1	6498.0	2,2,0	4,4,0	83.56
Ho_La1	6720.0	2,2,0	4,4,0	73.92
Er_La1	6949.0	2,2,0	4,4,0	68.31
Re_Lb1	10010.0	2,2,0	6,6,0	75.37
Os_Lb1	10354.0	2,2,0	6,6,0	69.30
Au_La1	9713.0	2,2,0	6,6,0	85.69
Hg_La1	9989.0	2,2,0	6,6,0	75.84
Tl_La1	10269.0	2,2,0	6,6,0	70.59
Pb_La1	10551.0	2,2,0	6,6,0	66.63
Ac_Mg	3270.0	2,2,0	2,2,0	80.86
Th_Mg	3370.8	2,2,0	2,2,0	73.29
Pa_Mg	3466.0	2,2,0	2,2,0	68.67
Pa_Mb	3240.0	2,2,0	2,2,0	85.17
U_Mb	3339.8	2,2,0	2,2,0	75.17
Np_Mb	3435.0	2,2,0	2,2,0	70.03
Np_Ma	3250.0	2,2,0	2,2,0	83.40
Pu_Ma	3339.0	2,2,0	2,2,0	75.22
Pu_Mb	3534.0	2,2,0	2,2,0	66.00
Am_Ma	3429.0	2,2,0	2,2,0	70.31
Cm_Ma	3525.0	2,2,0	2,2,0	66.33

## Si[4,0,0]

line	energy/eV	cut	bragg reflex.	bragg angle
Ti_Kb1	4933.4	4,0,0	4,0,0	67.74
V_Ka1	4952.9	4,0,0	4,0,0	67.20
Zn_Kb1	9570.4	4,0,0	8,0,0	72.58
Ga_Ka1	9250.6	4,0,0	8,0,0	80.80
Ge_Ka1	9886.0	4,0,0	8,0,0	67.47
Cs_Lb1	4618.5	4,0,0	4,0,0	81.33
Ba_Lb1	4828.3	4,0,0	4,0,0	71.02
La_La1	4647.0	4,0,0	4,0,0	79.27
Ce_La1	4839.2	4,0,0	4,0,0	70.65
Pr_La1	5035.2	4,0,0	4,0,0	65.06
Ta_Lb1	9343.0	4,0,0	8,0,0	77.79
W_Lb1	9672.0	4,0,0	8,0,0	70.76
Re_Lb1	10010.0	4,0,0	8,0,0	65.82
Ir_La1	9175.0	4,0,0	8,0,0	84.42
Pt_La1	9442.0	4,0,0	8,0,0	75.27
Au_La1	9713.0	4,0,0	8,0,0	70.07
Hg_La1	9989.0	4,0,0	8,0,0	66.09

## Si[4,2,2]

line	energy/eV	cut	bragg reflex.	bragg angle
Cr_Kb1	5946.8	4,2,2	4,2,2	70.11
Mn_Ka1	5900.3	4,2,2	4,2,2	71.39
As_Kb1	11725.8	4,2,2	8,4,4	72.51
Se_Ka1	11224.1	4,2,2	8,4,4	85.15
Br_Ka1	11924.0	4,2,2	8,4,4	69.71
Nd_Lb1	5718.7	4,2,2	4,2,2	77.91
Pm_Lb1	5961.0	4,2,2	4,2,2	69.73
Sm_La1	5632.6	4,2,2	4,2,2	83.11
Eu_La1	5849.5	4,2,2	4,2,2	72.93
Gd_La1	6053.4	4,2,2	4,2,2	67.48

## Si[3,3,1]

line	energy/eV	cut	bragg reflex.	bragg angle
V_Kb1	5427.8	3,3,1	3,3,1	66.44
Cr_Ka1	5414.9	3,3,1	3,3,1	66.76
La_Lb1	5038.0	3,3,1	3,3,1	80.96
Ce_Lb1	5261.6	3,3,1	3,3,1	71.02
Pr_La1	5035.2	3,3,1	3,3,1	81.16
Nd_La1	5227.6	3,3,1	3,3,1	72.13
Pm_La1	5432.0	3,3,1	3,3,1	66.34

## Si[6,2,0]

line	energy/eV	cut	bragg reflex.	bragg angle
Co_Kb1	7649.1	6,2,0	6,2,0	70.70
Ni_Ka1	7480.3	6,2,0	6,2,0	74.82
Dy_Lb1	7248.0	6,2,0	6,2,0	84.88
Ho_Lb1	7526.0	6,2,0	6,2,0	73.58
Er_Lb1	7811.0	6,2,0	6,2,0	67.55
Yb_La1	7416.0	6,2,0	6,2,0	76.77
Lu_La1	7655.0	6,2,0	6,2,0	70.57
Hf_La1	7899.0	6,2,0	6,2,0	66.05

## Si[5,3,1]

line	energy/eV	cut	bragg reflex.	bragg angle
Fe_Kb1	7059.3	5,3,1	5,3,1	73.06
Co_Ka1	6930.9	5,3,1	5,3,1	76.99
Tb_Lb1	6975.1	5,3,1	5,3,1	75.50
Dy_Lb1	7248.0	5,3,1	5,3,1	68.70
Er_La1	6949.0	5,3,1	5,3,1	76.36
Tm_La1	7180.0	5,3,1	5,3,1	70.14
Yb_La1	7416.0	5,3,1	5,3,1	65.59

## Accessible emission lines by element

### K

line	energy/eV	cut	bragg reflex.	bragg angle
K_Ka1	3313.8	2,2,0	2,2,0	76.97

### Ti

line	energy/eV	cut	bragg reflex.	bragg angle
Ti_Kb1	4933.4	4,0,0	4,0,0	67.74

### V

line	energy/eV	cut	bragg reflex.	bragg angle
V_Ka1	4952.9	4,0,0	4,0,0	67.20
V_Kb1	5427.8	3,3,1	3,3,1	66.44

### Cr

line	energy/eV	cut	bragg reflex.	bragg angle
Cr_Ka1	5414.9	3,3,1	3,3,1	66.76
Cr_Kb1	5946.8	1,1,1	3,3,3	85.84
Cr_Kb1	5946.8	4,2,2	4,2,2	70.11

### Mn

line	energy/eV	cut	bragg reflex.	bragg angle
Mn_Ka1	5900.3	4,2,2	4,2,2	71.39
Mn_Kb1	6491.8	2,2,0	4,4,0	84.06
Mn_Kb1	6491.8	1,1,1	3,3,3	66.01

### Fe

line	energy/eV	cut	bragg reflex.	bragg angle
Fe_Ka1	6405.2	1,1,1	3,3,3	67.82
Fe_Kb1	7059.3	5,3,1	5,3,1	73.06
Fe_Kb1	7059.3	2,2,0	4,4,0	66.16

### Co

line	energy/eV	cut	bragg reflex.	bragg angle
Co_Ka1	6930.9	5,3,1	5,3,1	76.99
Co_Ka1	6930.9	2,2,0	4,4,0	68.69
Co_Kb1	7649.1	6,2,0	6,2,0	70.70

### Ni

line	energy/eV	cut	bragg reflex.	bragg angle
Ni_Ka1	7480.3	6,2,0	6,2,0	74.82
Ni_Kb1	8266.8	1,1,1	4,4,4	73.06

## Cu

line	energy/eV	cut	bragg reflex.	bragg angle
Cu_Ka1	8046.3	1,1,1	4,4,4	79.37

## Zn

line	energy/eV	cut	bragg reflex.	bragg angle
Zn_Ka1	8637.2	1,1,1	4,4,4	66.29
Zn_Kb1	9570.4	4,0,0	8,0,0	72.58

## Ga

line	energy/eV	cut	bragg reflex.	bragg angle
Ga_Ka1	9250.6	4,0,0	8,0,0	80.80
Ga_Kb1	10267.0	2,2,0	6,6,0	70.62
Ga_Kb1	10267.0	1,1,1	5,5,5	74.33

## Ge

line	energy/eV	cut	bragg reflex.	bragg angle
Ge_Ka1	9886	1,1,1	5,5,5	89.27
Ge_Ka1	9886	4,0,0	8,0,0	67.47
Ge_Ka1	9886	2,2,0	6,6,0	78.44

## As

line	energy/eV	cut	bragg reflex.	bragg angle
As_Ka1	10543.4	2,2,0	6,6,0	66.73
As_Ka1	10543.4	1,1,1	5,5,5	69.65
As_Kb1	11725.8	4,2,2	8,4,4	72.51

## Se

line	energy/eV	cut	bragg reflex.	bragg angle
Se_Ka1	11224.1	4,2,2	8,4,4	85.15

## Br

line	energy/eV	cut	bragg reflex.	bragg angle
Br_Ka1	11924	4,2,2	8,4,4	69.71
Br_Kb1	13292	2,2,0	8,8,0	76.30

## Cd

line	energy/eV	cut	bragg reflex.	bragg angle
Cd_Lb1	3315.1	2,2,0	2,2,0	76.87

## In

line	energy/eV	cut	bragg reflex.	bragg angle
In_La1	3286.1	2,2,0	2,2,0	79.26
In_Lb1	3486.6	2,2,0	2,2,0	67.82

## Sn

line	energy/eV	cut	bragg reflex.	bragg angle
Sn_La1	3444.1	2,2,0	2,2,0	69.62

## Cs

line	energy/eV	cut	bragg reflex.	bragg angle
Cs_Lb1	4618.5	4,0,0	4,0,0	81.33

## Ba

line	energy/eV	cut	bragg reflex.	bragg angle
Ba_Lb1	4828.3	4,0,0	4,0,0	71.02

## La

line	energy/eV	cut	bragg reflex.	bragg angle
La_La1	4647	4,0,0	4,0,0	79.27
La_Lb1	5038	3,3,1	3,3,1	80.96

## Ce

line	energy/eV	cut	bragg reflex.	bragg angle
Ce_La1	4839.2	4,0,0	4,0,0	70.65
Ce_Lb1	5261.6	3,3,1	3,3,1	71.02

## Pr

line	energy/eV	cut	bragg reflex.	bragg angle
Pr_La1	5035.2	3,3,1	3,3,1	81.16
Pr_La1	5035.2	4,0,0	4,0,0	65.06

## Nd

line	energy/eV	cut	bragg reflex.	bragg angle
Nd_La1	5227.6	3,3,1	3,3,1	72.13
Nd_Lb1	5718.7	4,2,2	4,2,2	77.91

## Pm

line	energy/eV	cut	bragg reflex.	bragg angle
Pm_La1	5432	3,3,1	3,3,1	66.34
Pm_Lb1	5961	4,2,2	4,2,2	69.73
Pm_Lb1	5961	1,1,1	3,3,3	84.26



## Sm

line	energy/eV	cut	bragg reflex.	bragg angle
Sm_La1	5632.6	4,2,2	4,2,2	83.11
Sm_Lb1	6201.1	1,1,1	3,3,3	73.03

## Eu

line	energy/eV	cut	bragg reflex.	bragg angle
Eu_La1	5849.5	4,2,2	4,2,2	72.93
Eu_Lb1	6458.4	2,2,0	4,4,0	88.80
Eu_Lb1	6458.4	1,1,1	3,3,3	66.69

## Gd

line	energy/eV	cut	bragg reflex.	bragg angle
Gd_La1	6053.4	1,1,1	3,3,3	78.46
Gd_La1	6053.4	4,2,2	4,2,2	67.48
Gd_Lb1	6708.1	2,2,0	4,4,0	74.27

## Tb

line	energy/eV	cut	bragg reflex.	bragg angle
Tb_La1	6272.9	1,1,1	3,3,3	71.00
Tb_Lb1	6975.1	5,3,1	5,3,1	75.50
Tb_Lb1	6975.1	2,2,0	4,4,0	67.78

## Dy

line	energy/eV	cut	bragg reflex.	bragg angle
Dy_La1	6498	2,2,0	4,4,0	83.56
Dy_La1	6498	1,1,1	3,3,3	65.89
Dy_Lb1	7248	5,3,1	5,3,1	68.70
Dy_Lb1	7248	6,2,0	6,2,0	84.88

## Ho

line	energy/eV	cut	bragg reflex.	bragg angle
Ho_La1	6720	2,2,0	4,4,0	73.92
Ho_Lb1	7526	6,2,0	6,2,0	73.58

## Er

line	energy/eV	cut	bragg reflex.	bragg angle
Er_La1	6949	5,3,1	5,3,1	76.36
Er_La1	6949	2,2,0	4,4,0	68.31
Er_Lb1	7811	6,2,0	6,2,0	67.55

## Tm

line	energy/eV	cut	bragg reflex.	bragg angle
Tm_La1	7180	5,3,1	5,3,1	70.14
Tm_Lb1	8102	1,1,1	4,4,4	77.44

## Yb

line	energy/eV	cut	bragg reflex.	bragg angle
Yb_La1	7416	5,3,1	5,3,1	65.59
Yb_La1	7416	6,2,0	6,2,0	76.77
Yb_Lb1	8402	1,1,1	4,4,4	70.26

## Lu

line	energy/eV	cut	bragg reflex.	bragg angle
Lu_La1	7655	6,2,0	6,2,0	70.57
Lu_Lb1	8710	1,1,1	4,4,4	65.22

## Hf

line	energy/eV	cut	bragg reflex.	bragg angle
Hf_La1	7899	6,2,0	6,2,0	66.05

## Ta

line	energy/eV	cut	bragg reflex.	bragg angle
Ta_La1	8146	1,1,1	4,4,4	76.12
Ta_Lb1	9343	4,0,0	8,0,0	77.79

## W

line	energy/eV	cut	bragg reflex.	bragg angle
W_La1	8398	1,1,1	4,4,4	70.33
W_Lb1	9672	4,0,0	8,0,0	70.76

## Re

line	energy/eV	cut	bragg reflex.	bragg angle
Re_La1	8652	1,1,1	4,4,4	66.07
Re_Lb1	10010	1,1,1	5,5,5	80.94
Re_Lb1	10010	2,2,0	6,6,0	75.37
Re_Lb1	10010	4,0,0	8,0,0	65.82

## Os

line	energy/eV	cut	bragg reflex.	bragg angle
Os_Lb1	10354	1,1,1	5,5,5	72.69
Os_Lb1	10354	2,2,0	6,6,0	69.30

## Ir

line	energy/eV	cut	bragg reflex.	bragg angle
Ir_La1	9175	4,0,0	8,0,0	84.42
Ir_Lb1	10708	1,1,1	5,5,5	67.39

## Pt

line	energy/eV	cut	bragg reflex.	bragg angle
Pt_La1	9442	4,0,0	8,0,0	75.27

## Au

line	energy/eV	cut	bragg reflex.	bragg angle
Au_La1	9713	2,2,0	6,6,0	85.69
Au_La1	9713	4,0,0	8,0,0	70.07

## Hg

line	energy/eV	cut	bragg reflex.	bragg angle
Hg_La1	9989	4,0,0	8,0,0	66.09
Hg_La1	9989	2,2,0	6,6,0	75.84
Hg_La1	9989	1,1,1	5,5,5	81.73

## Tl

line	energy/eV	cut	bragg reflex.	bragg angle
Tl_La1	10269	1,1,1	5,5,5	74.29
Tl_La1	10269	2,2,0	6,6,0	70.59

## Pb

line	energy/eV	cut	bragg reflex.	bragg angle
Pb_La1	10551	1,1,1	5,5,5	69.54
Pb_La1	10551	2,2,0	6,6,0	66.63

## Bi

line	energy/eV	cut	bragg reflex.	bragg angle
Bi_La1	10839	1,1,1	5,5,5	65.78

## Ac

line	energy/eV	cut	bragg reflex.	bragg angle
Ac_Mg	3270	2,2,0	2,2,0	80.86

## Th

line	energy/eV	cut	bragg reflex.	bragg angle
Th_Mg	3370.8	2,2,0	2,2,0	73.29

## Pa

line	energy/eV	cut	bragg reflex.	bragg angle
Pa_Mb	3240	2,2,0	2,2,0	85.17
Pa_Mg	3466	2,2,0	2,2,0	68.67

## U

line	energy/eV	cut	bragg reflex.	bragg angle
U_Mb	3339.8	2,2,0	2,2,0	75.17

## Np

line	energy/eV	cut	bragg reflex.	bragg angle
Np_Ma	3250	2,2,0	2,2,0	83.40
Np_Mb	3435	2,2,0	2,2,0	70.03

## Pu

line	energy/eV	cut	bragg reflex.	bragg angle
Pu_Ma	3339	2,2,0	2,2,0	75.22
Pu_Mb	3534	2,2,0	2,2,0	66.00

## Am

line	energy/eV	cut	bragg reflex.	bragg angle
Am_Ma	3429	2,2,0	2,2,0	70.31

## Cm

line	energy/eV	cut	bragg reflex.	bragg angle
Cm_Ma	3525	2,2,0	2,2,0	66.33