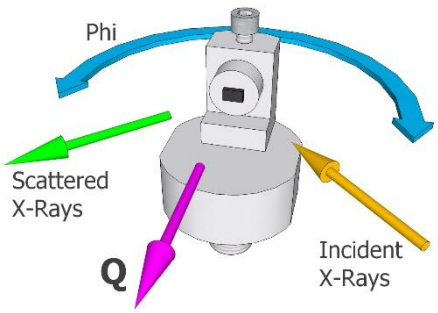
Sample orientation at sector 27 in horizontal geometry

Why it's different here

The two-theta (tth) and theta (th) stages are combined as one stage at sector 27.

In SPEC the orientation matrix, **UB**, describes the sample orientation with respect to the diffractometer angles. Given **UB**, it is possible to calculate the diffractometer angles (tth, th ,chi, phi). Since tth=th at all times at sector 27 we have adapted the normal SPEC macros to account for this.



The motor mu is the same as the motor tth. Users shouldn't worry about this; it's included in this document to prevent alarm if you happen to notice it.

How to input two Bragg peaks, and hints on how to find them.

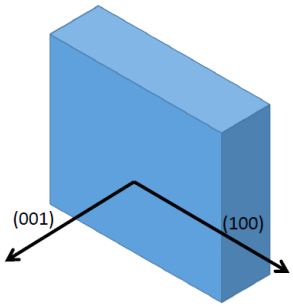
A major pitfall of tth=th is accidently aiming the back of the sample holder at the incident beam or detector. If the sample face is parallel to the beam at tth=phi=0 the specular reflection will be at tth=+N, phi=-N/2. Under these conditions phi must be negative and greater than –tth to keep the face of the sample visible to the incident beam and the detector.

If aligned on a Bragg peak

Type `or0` (or `or1`) as usual. This records the current motor values and assigns them to a Bragg peak. (incorrectly) records th=0. Type `updateOR`, which corrects the value of th from 0 to th=tth. It does it for both Bragg peaks in the UB matrix.

If inputting a Bragg peak blind

For example, suppose the first Bragg peak (0 0 10) has been found and both or0 and updateOR run. Typing `pa` will display the current Bragg entries.




```
2636.RIXS4> pa

Four-Circle Geometry, Theta fixed (mode 7)
Frozen values:  Theta = 38.7752
Sector 0

  Primary Reflection (at lambda 1.48877):
          tth th chi phi = 33.1525 33.1525 -1.9 -16.9055
                   H K L = 0 0 10
```

```
 Secondary Reflection (at lambda 1.10524):
         tth th chi phi = 70.437 70.437 0.80975 -35.3469
                  H K L = 4 0 0

 Lattice Constants (lengths / angles):
             real space = 3.97 3.97 26.09 / 90 90 90
       reciprocal space = 1.583 1.583 0.2408 / 90 90 90

 Azimuthal Reference:
                  H K L = 0 0 1

                 Lambda = 1.48877

Cut Points:
     tth   th  chi  phi
    -180 -180 -180 -180
```

Note that (0 0 10) has tth=th=33.1525 with a small chi and a negative phi with a value around half of tth. The second reflection, (4 0 0), is in place from a previous alignment. To use SPEC to help find an in plane peak a fake Bragg peak can be entered.

```
2637.RIXS4> setor1

Enter secondary-reflection angles:
 Two Theta (70.437)? 33.1525
 Theta (70.437)? 123.1525
 Chi (0.80975)? -1.9
 Phi (-35.3469)? -16.9055

Enter secondary-reflection HKL coordinates:
 H (4)? 1
 K (0)? 0
 L (0)? 0
```

The only difference between or0 and or1 is that 90 is added to th. The same values for tth, chi and phi are used for or1 as were found for or0. Do not run updateOR as this would change th to the entered value of tth.

Translating SPEC to sector 27 SPEC

Normal SPEC	Sector 27 SPEC
setlat	setlat
ca	hca
ubr	hubr
pa	pa
or0, or1	or0, or1 followed by updateOR
hklscan	hhklscan