NAME

monochromator – monochromator control macros

DESCRIPTION

spec supports energy-selecting monochromators in three configurations. The first configuration uses a single motor to control the monochromator tilt. The second configuration uses three motors to control the tilt of two crystals and the travel distance between them. The third configuration takes into account a fourth motor to control the offset between the two crystals. (In the three-motor configuration the offset is a fixed parameter.)

All of the monochromator support is contained in the macro source file *macros/energy.mac*, which is automatically installed with the standard macro library. When the macros are read, commands from the *energy.mac* file check whether particular motor mnemonics are present in the *config* file. Motors with mnemonics `monu`, `mond`, `montrav` and `monoff` select the four-motor configuration. The mnemonics stand for the upstream, downstream, travel and offset monochromator motors. If there are only motors with mnemonics `monu`, `mond` and `montrav`, the three-motor configuration is selected. Having just a motor with a mnemonic of either `monu` or `mono` selects the one-motor configuration.

USER-INVOKED MACROS

`setmono [`*`d-spacing`*`] [`*`offset`*`]` – Used to enter the monochromator d-spacing. If using a three-motor monochromator, you can also enter the offset between the two crystals. With no arguments, the macro will prompt you to enter values. If you enter a `0` for the d-spacing in interactive mode, you will then be prompted to enter the type of crystal and its Miller indices. The macro will then calculate the d-spacing for you. The macro knows about Silicon and Germanium crystals. For other materials, you need to enter the crystal lattice parameter. The distributed `setmono` only allows you to change the parameters if you have write permission for the file *g_mo_d.mac* in spec's auxiliary file directory. The current values of the parameters `g_mo_d` and `g_mo_s` (if used) are stored in that file. If you can't write the *g_mo_d.mac* file, the file is read as a command file. If you can write to the file, the file will be updated with the new parameters.

`getE` – Displays the current energy calculated from the monochromator motor position(s).

`moveE` *`energy_in_KeV`* – Moves the monochromator motor(s) to correspond to the energy value given as an argument. The macro writes the new energy to the printer and data file using the `comment` macro.

`setE` *`energy_in_KeV`* – Changes the user offset of the monochromator motor(s) so that the current motor position(s) correspond to the energy value given as an argument. No motors are moved. The `set` macro, which comments a change of a motor's user offset to the printer and data file, is used within `setE`. (Additional motors that may be involved by way of the `calcM_local` macro will not be set by this macro.)

`Escan` *`start end intervals time`* `[ fixQ ]` – Does an energy scan, starting at the energy given by *`start`* and ends at the energy given by *`end`*. The step size is (*`start`*`-`*`end`*`)/`*`intervals`*. The number of data points collected will be *`intervals`*`+1`. Count time is given by *`time`*, which if positive, specifies seconds and if negative, specifies monitor counts. If the optional fifth argument is given as the literal characters `fixQ`, the values of `H`, `K` and `L` at the start of the scan are maintained at each point.

INTERNAL MACROS AND GLOBAL VARIABLES

`mono_type` – Global variable set to one, three or four representing the number of motors in the monochromator.

`g_mo_d` – Global variable containing the monochromator d-spacing in Angstroms.

`g_mo_s` – Global variable containing the offset for the three-motor monochromator in millimeters.

`xtal_ind` – Global array containing the Miller indices of the crystal (if d-spacing is specified by Miller indices and crystal type).

`xtal_lat` – Global variable containing the monochromator crystal lattice parameter in Angstroms (if d-spacing is specified by Miller indices and crystal type).

`xtal_type` – Global variable describing the material of the crystal (if d-spacing is specified by Miller indices and crystal type). It is set to `"S"` for Si, `"G"` for Ge and `"o"` for any other material.

`calcM` *`energy_in_KeV`* – Calculates standard monochromator motor positions from the argument. Calls the macro `calcM_local`, if defined, to calculate additional motor positions.

`calcM_local` *`energy_in_KeV`* – Optionally defined by local users to calculate motor positions for monochromator motors not taken care of in `calcM`.

`calcE` – Calculates `LAMBDA` from motor positions.

`_chk_mlim` – Checks limits on monochromator motors, used by `Escan`.

`pa_mono` – Displays monochromator parameters as part of the `pa` macro.

`sav_mono` – Saves monochromator parameters as part of the `save` macro.

`miller` – Used by setmono to calculate d-spacing from Miller indices.

`_assign_mono` – Figures out which kind of monochromator is being used from motor mnemonics specified in the *config* file. This macro is called after the `reconfig` statement in the `config` macro.

NOTES

To control access to the monochromator parameters, the spec administrator can set the write permission and ownership of the *g_mo_d.mac* file appropriately.

To have the monochromator parameters automatically read in by each user running spec, put the line

```
qdofile(sprintf("%s/g_mo_d.mac",SPECD))
```

in the *site.mac* file in the auxiliary file directory. (The *site.mac* file is automatically read as a command file each time a user starts spec.)

The business of storing the monochromator parameters in a file will need to be changed if there is more than one version of spec using monochromators running at the same time on the same computer.