

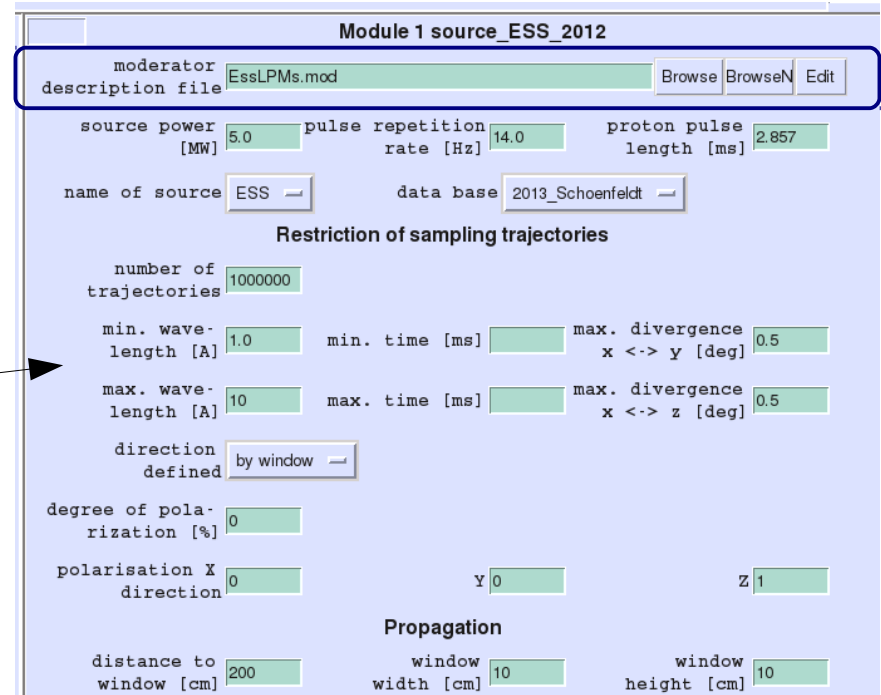
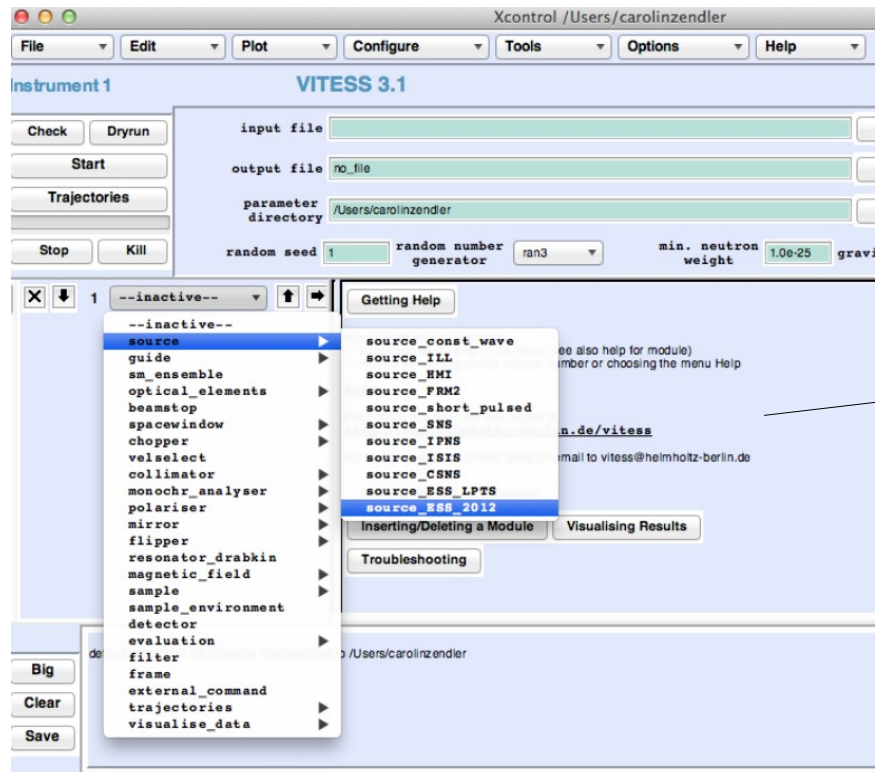
**Ex. 1 VITNESS components:**  
**source, monitors, sample,**  
**detector**

**Joint VITNESS/McStas workshop**  
**18.-20.09.2013**

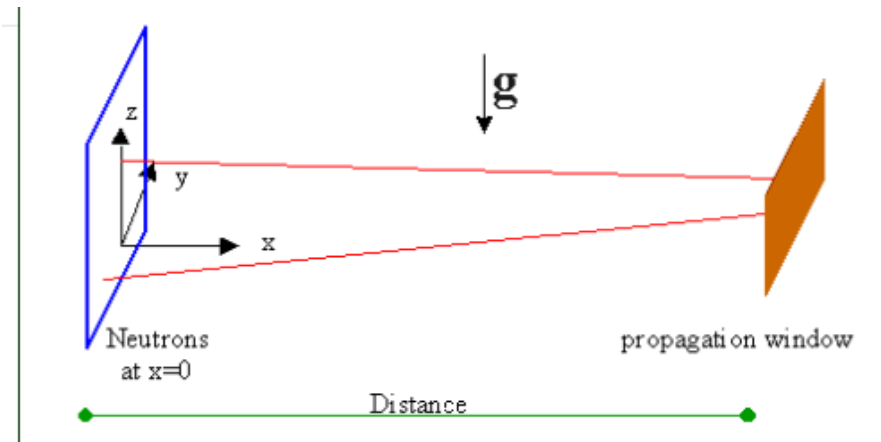
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# Neutron sources in VITESS



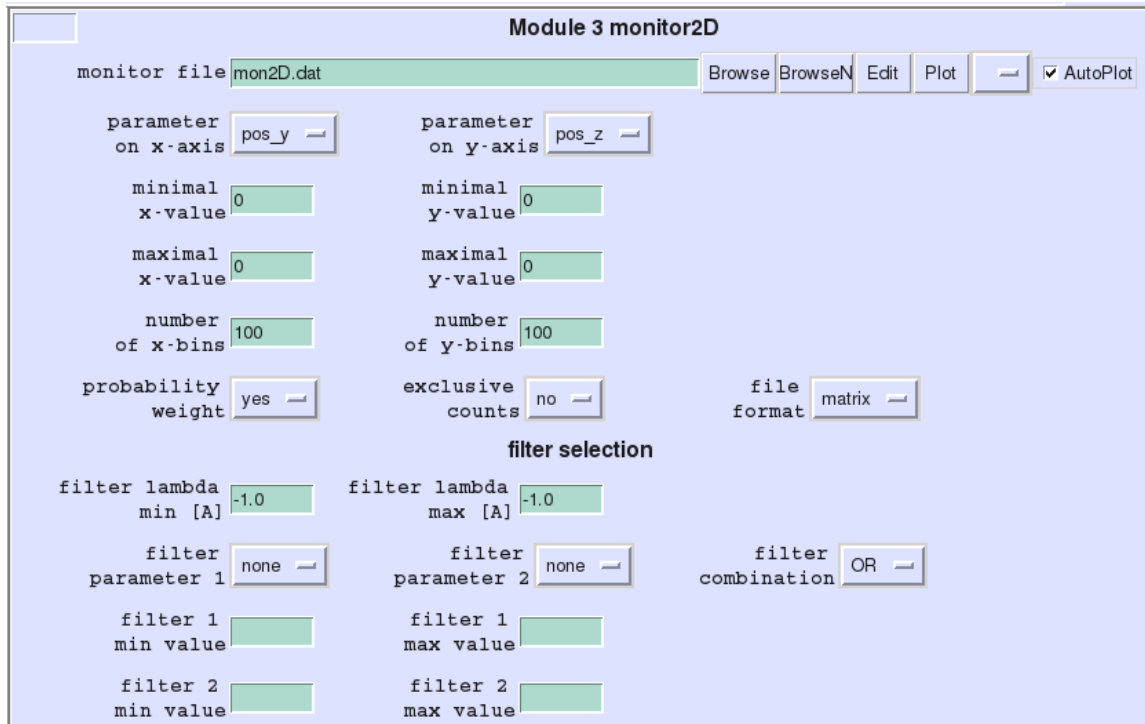
- Choose a source
- Choose standard moderator description from FILES/moderators



- The moderator file

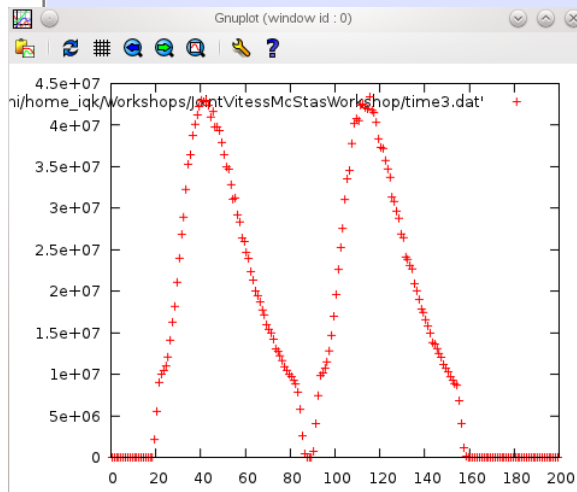
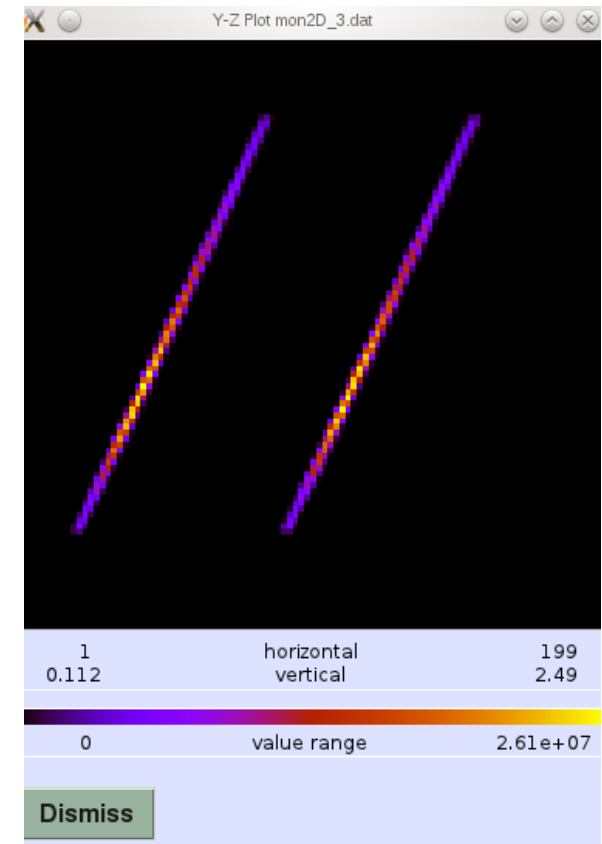
The screenshot shows a software interface for configuring neutron moderators. It is titled 'Edit EssLPCold.mod' and contains two sections: 'Moderator 1' and 'Moderator 2'.  
**Moderator 1 configuration:**  
- moderator type: 'coupled' (dropdown)  
- shape: 'rectangular' (dropdown)  
- moderator diameter or width [cm]: 12.0 (input field)  
- moderator height [cm]: 12.0 (input field)  
- spatial order: 0 (input field)  
- center of moderator X [cm]: 0.0 (input field)  
- center Y [cm]: 0.0 (input field)  
- center Z [cm]: 0.0 (input field)  
- total flux at moderator [n/(cm²s)]: 0.0 (input field)  
- neutron current [n/s]: 0.0 (input field)  
- user wavelength dist. file: [empty field] with 'Browse', 'BrowseN', and 'Edit' buttons.  
- moderator temperature [K]: 50.0 (input field)  
- colour: 0 (input field)  
- user wavelength time dist. file: [empty field] with 'Browse', 'BrowseN', and 'Edit' buttons.  
- tau\_1 [us]: 0 (input field)  
- tau\_2 [us]: 0 (input field)  
- user time dist. file: [empty field] with 'Browse', 'BrowseN', and 'Edit' buttons.  
**Moderator 2 configuration:**  
- second moderator: 'unused' (dropdown)  
- moderator type: '-' (dropdown)  
- shape: 'rectangular' (dropdown)  
- moderator diameter or width [cm]: 0 (input field)  
- moderator height [cm]: 0 (input field)  
- spatial order: [empty field] (input field)

- you can use up to 3 moderators
- optional: user-defined wavelength and time distribution



2-dim can be written in

- matrix format (no error, traj)
- xyz format (+err +N\_traj)



1-dim contains 4 columns:

- parameter value x-axis
- intensity [n/s]
- uncertainty of intensity
- number of trajectories

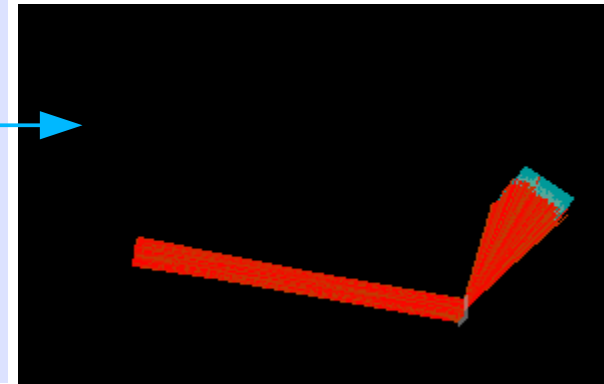
## Several monitor options in Vitess 3.1:

- generic 1d/2d monitor modules (new)  
`monitor1D`, `monitor2D`
- separate modules for parameters (old)  
`mon1_time`, `mon1_lambda`, ....  
`mon2_pos`, `mon2_div`, `mon2_wldiv`, ....
- brilliance monitor (new)  
brilliance instead of intensity, can be weighted with reference file (e.g. source brilliance)  
`mon_brilliance`
- `capture_flux`:  
gives integrated, wavelength weighted flux (output in logfile)

- different modules for different types of samples
- powder sample:

see also  
sample exercise 3(f)

define scattering direction



**Module 5 sample\_powder**

sample file  Browse BrowseN Edit

Theta [deg]  dTheta [deg]  Phi [deg]

dPhi [deg]  repetitions  colour

incoherent scattering  treat all neutrons

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**Sample**

x [cm]  y [cm]  z [cm]  position

sample geometry  geometry

thickness or radius [cm]  height [cm]  width [cm]  geometry

structure factor file  Browse BrowseN Edit orientation

x direction  y direction  z direction  orientation

**Scattering**

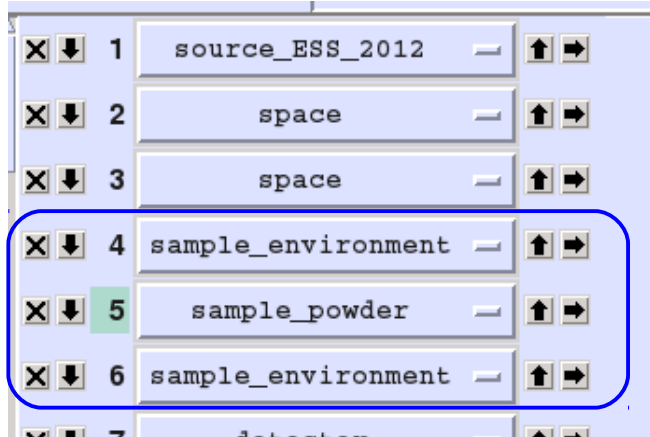
incoherent scattering [1/cm]  total scattering [1/cm]  absorption [1/cm]  cross sections

unit cell volume [Å<sup>3</sup>]

Check Save+Close Save As Cancel

#	d	Mult	x / F (HKL) 2/
7.2528	11.29		
5.1285	99.88		
4.1874	206.45		
3.6264	483.87		
3.2435	84.91		
3.2435	18.15		
2.9609	193.98		
2.7413	97.55		
2.7413	235.32		
2.5642	346.56		
2.4176	851.75		
2.4176	5.39		
2.2935	634.23		
2.2935	669.61		
2.1868	3485.08		
2.0937	72.30		

contains  
d-spacing and  
structure factor



- has to be inserted twice:  
before and after sample

- see sample exercise 3(f)  
for details

**General detector geometry**

array (first or intermediated part)

geometry  type  usage

repetition  detect color  add color

phi [deg]  theta [deg]  distance [cm]

height [cm]  width [cm]  thickness [cm]

number of rows  number of columns  number of layers

hor. resolution [cm]  vert. resolution [cm]  resolution in x [cm]

efficiency modifier

lambda efficiency

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**absorber/converter type**

gas pressure [bar] or solid layer thickness [cm]  gas temperature [K] or atom density (solid) [ $10^{27}$  1/m<sup>3</sup>]

**Tube detector**

tube orientation  tube cross-section

wall thickness [mm]

layers shifted

**Cylindrical geometry**

axis orientation

const. phi

**Output file**

Output filename

flat or cylinder

area/volume or tube det.

usage:

- normal: include all effects (detection probability dependent on wavelength, position, detection in wrong cell, detection in pixel center)
- monitor only: true interaction position, efficiency 1
- grid off: true interaction position, efficiency included

position geometry  
partitioning  
resolution

absorber/converter type  
gas pressure [bar] or solid layer thickness [cm]  
gas temperature [K] or atom density (solid) [ $10^{27}$  1/m<sup>3</sup>]

detection efficiency from material

many detector options: see detector exercise 3(e)



evaluation parameter

spectrum file  Browse BrowseN Edit Plot

intensity file  Browse BrowseN Edit

info file  Browse BrowseN Edit

number of bins  minimum  [A, 1/A, deg] maximum  [A, 1/A, deg]

increase to next bin[%]  dead-spot [deg]

probability weight  exclusive counts  Scattering axis of the sample

time of flight  correct tof to distance

flight path [cm]  sample-detector distance [cm]  time offset [ms]

reference wavelength [A]  time interval begin [ms]  time interval end [ms]

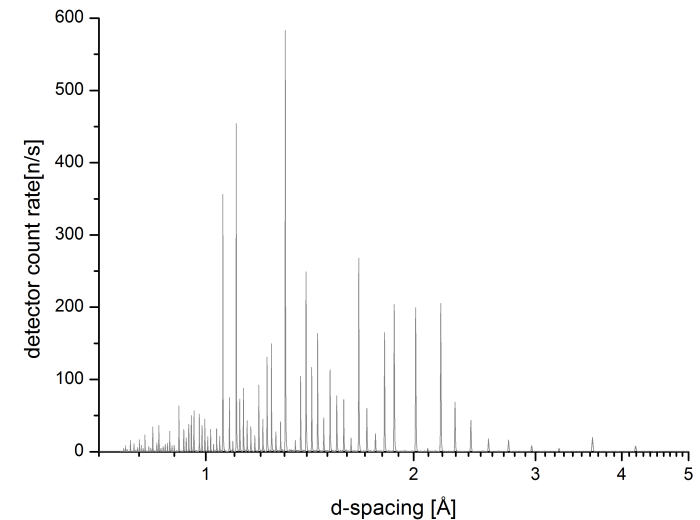
colour

evaluation parameter:

- scattering angle
- d-spacing
- Q

time-of-flight analysis:

- corrects for different flight path from sample to detector edge vs center



# remember: Help System

The screenshot shows the Vites2-10beta software interface. The 'Help' menu is open, and the 'bender' module is selected. A Firefox browser window displays the help page for the 'VITESS Universal Module Bender'. The browser window title is 'Universal Module Bender - Mozilla Firefox' and the address bar shows 'file:///D:/Programme/Vites2-10beta/WWW/bender.html'. The help page content includes:

### VITESS Universal Module Bender

The module **Bender** is similar to the module **Guide** using the **bender** option. The main difference is that the 'bended guide' consists of several straight parts that form a polygon section. In contrast, the bender surfaces are circles (but straight surfaces also possible). Also the module **Bender** simulates converging (diverging) bender-polarizator with possibility of enabled or disabled polarising neutrons. The 2-D visualization of surfaces and trace of neutrons path are included (using PGPLOT and G2 graphic libraries). Only first 10000 trajectories will be visualised. Also you can choose the device for visualisation: display, file or both.

Additionally there is a possibility to have spacing inside the bender.  
THE SURFACES IS SITUATED IN XZ PLANE.

Picture 1. One channel of the bender

#### Simulation parameters

The effect of gravity is considered in this module, if this option is chosen. Neutrons with a probability/current less than the 'minimal weight' are taken out of

Annotations in the screenshot include:

- A red circle around the 'Help' menu item.
- A red circle around the 'bender' module in the 'Modules A - F' list.
- A green circle around the 'helper threads' text in the bottom left.
- A green circle around the text 'Click parameter names for help!' in the top right.
- A green arrow pointing from the 'Click parameter names for help!' text to the 'bender' module.
- A red dashed arrow pointing from the 'bender' module to the browser window.