

Ex. 1: Basics, Source, Monitors, Guides

1.1: mcgui, editor, Source_simple, Guide, Monitors

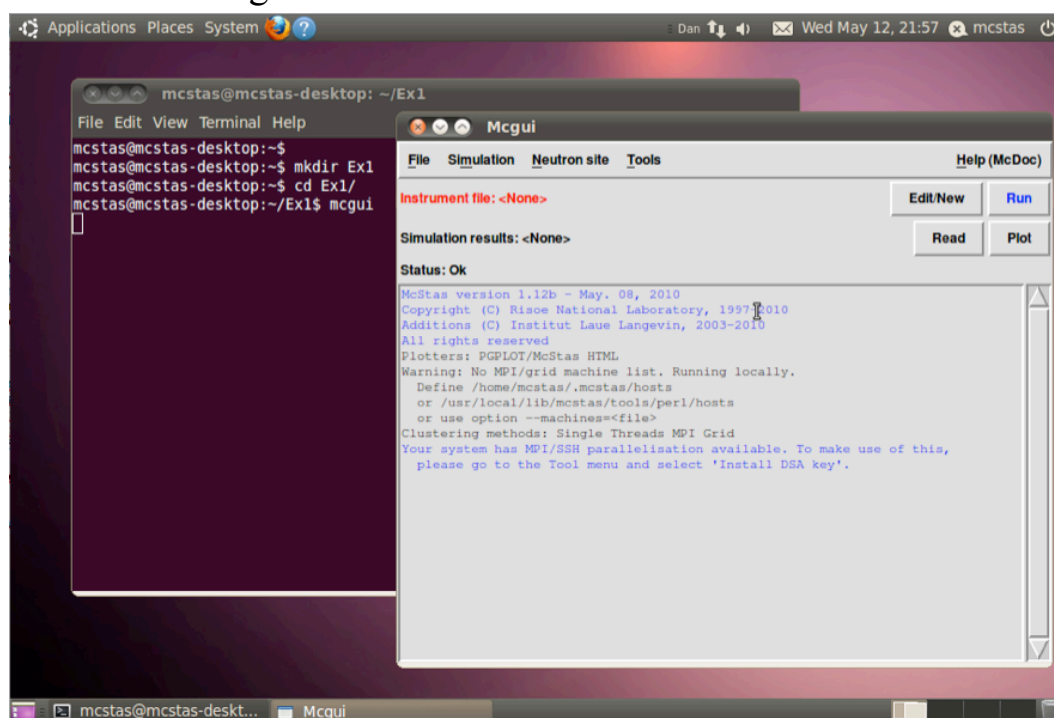


Starting mcgui

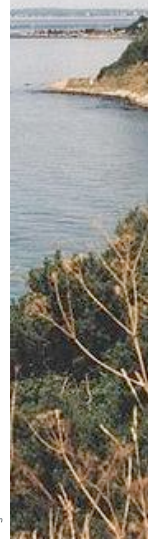
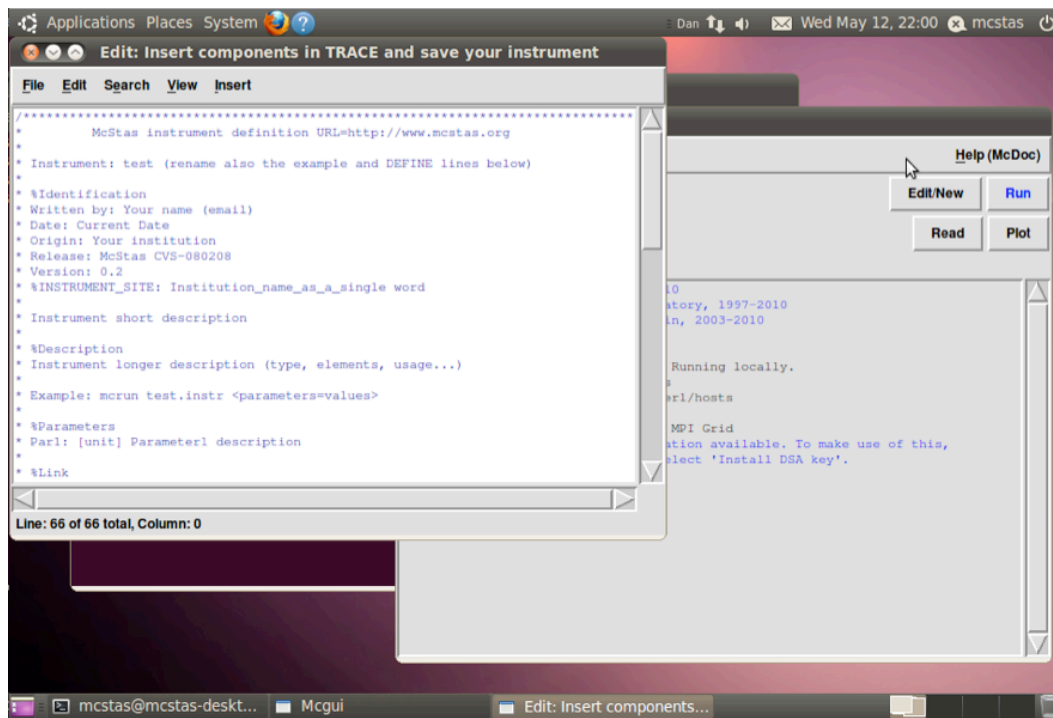
Start a terminal (OS dependent)

cd to a dir of choice

Issue the mcgui command

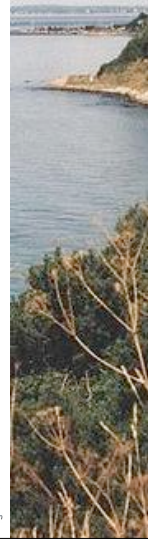
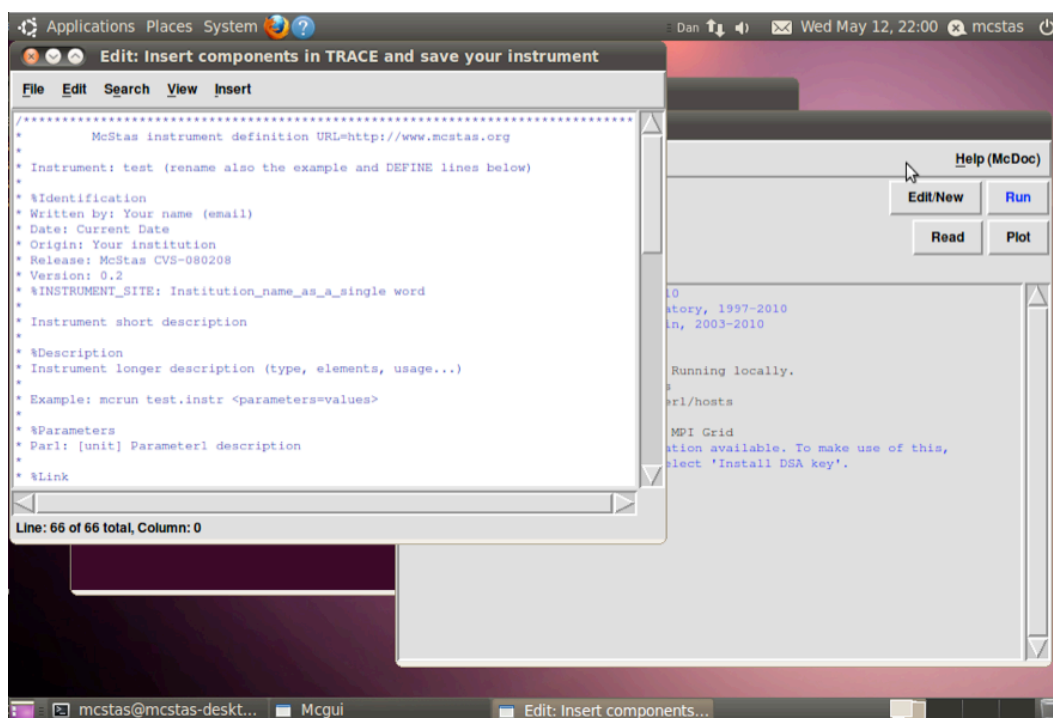


Press Edit/New to create a new file
 On emerging window, choose Insert - Instrument template
 Choose File - Save As - Ex01.instr



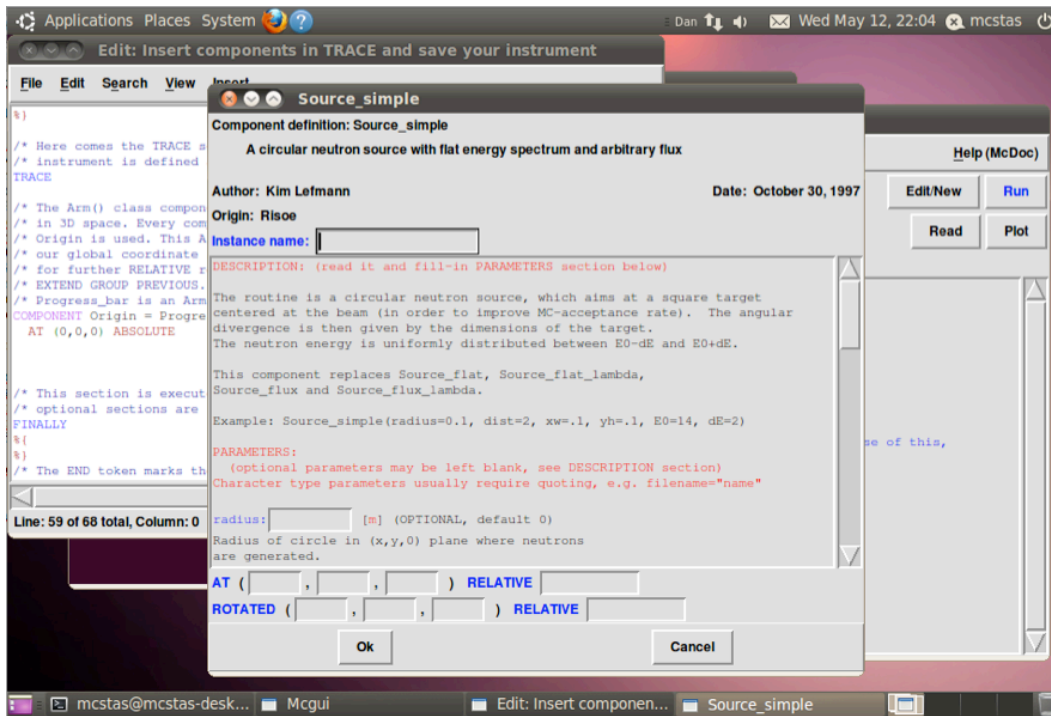
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Scroll to TRACE section and insert cursor after the Origin comp
 Chose Insert - Source - Source_simple



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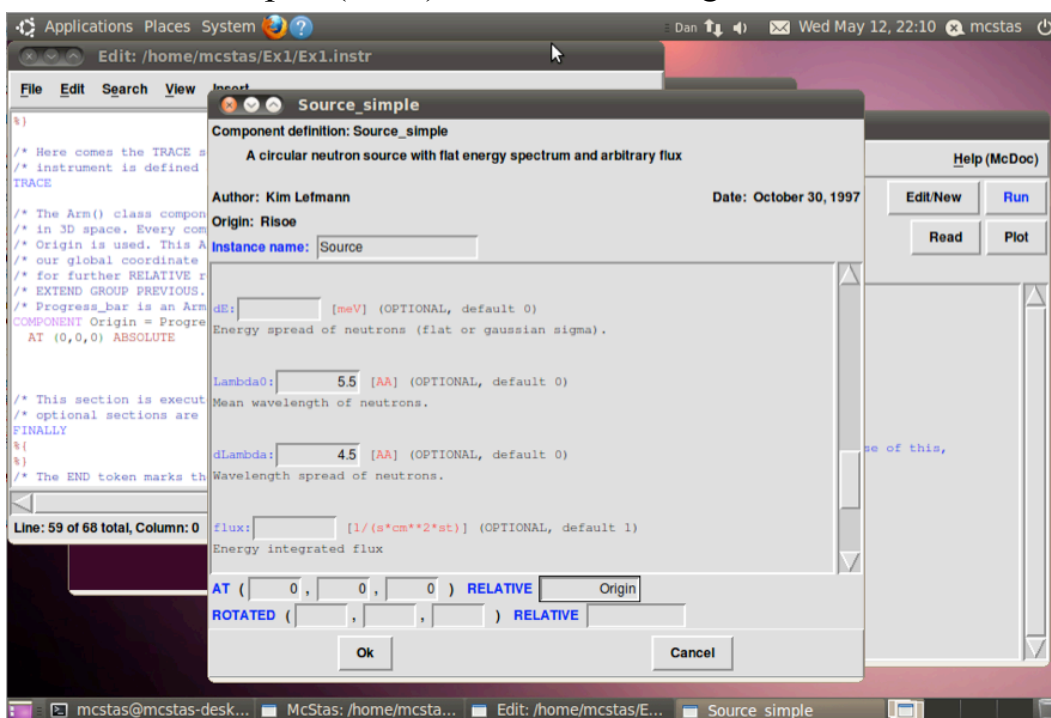
Scroll to TRACE section and insert cursor after the Origin comp
 Chose Insert - Source - Source_simple



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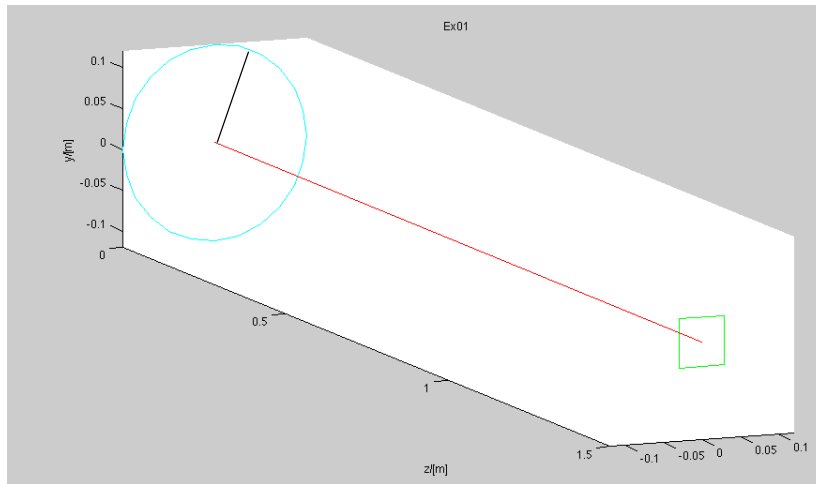
Name the component Source
 Choose parameters: radius=0.12, Lambda0=5.5,
 dLambda=4.5, dist=1.5, xw=0.06, yh=0.06
 Place the comp at (0,0,0) RELATIVE Origin



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Significance of Source_simple parameters



Input parameters

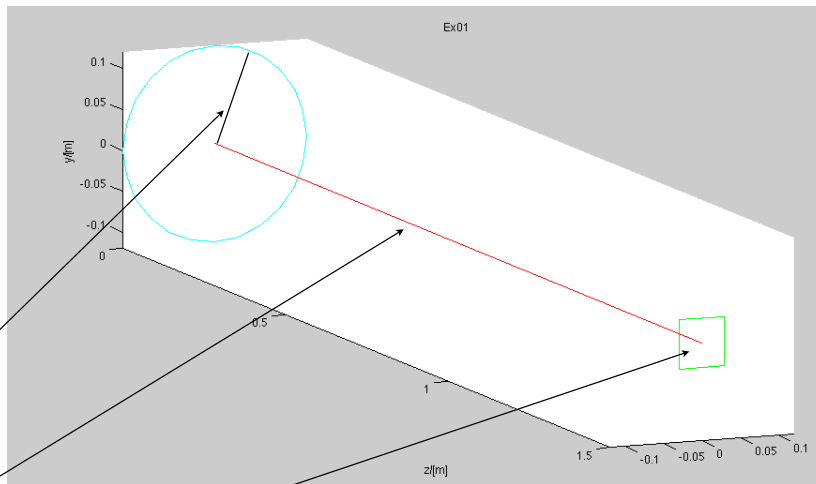
Parameters in **boldface** are required; the others are optional.

Name	Unit	Description	Default
radius	m	Radius of circle in (x,y,0) plane where neutrons are generated.	0
height	m	Height of rectangle in (x,y,0) plane where neutrons are generated.	0
width	m	Width of rectangle in (x,y,0) plane where neutrons are generated.	0
dist	m	Distance to target along z axis.	
xw	m	Width(x) of target	
yh	m	Height(y) of target	
E0	meV	Mean energy of neutrons.	0
dE	meV	Energy spread of neutrons (flat or gaussian sigma).	0
Lambda0	AA	Mean wavelength of neutrons.	0
dLambda	AA	Wavelength spread of neutrons.	0
flux	1/(s*cm**2*st)	Energy integrated flux	1
gauss	1	Gaussian (1) or Flat (0) energy/wavelength distribution	0
compat	1	Apply weighting/sampling as now obsolete Source_flat component	0

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Significance of Source_simple parameters



Input parameters

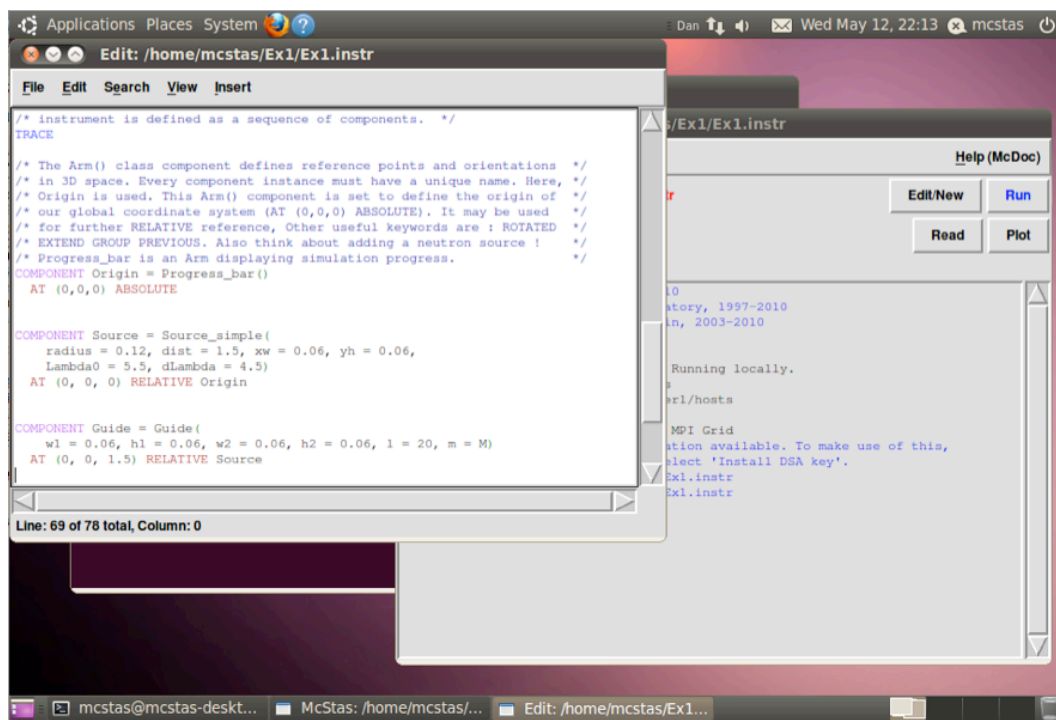
Parameters in **boldface** are required; the others are optional.

Name	Unit	Description	Default
radius	m	Radius of circle in (x,y,0) plane where neutrons are generated.	0
height	m	Height of rectangle in (x,y,0) plane where neutrons are generated.	0
width	m	Width of rectangle in (x,y,0) plane where neutrons are generated.	0
dist	m	Distance to target along z axis.	
xw	m	Width(x) of target	
yh	m	Height(y) of target	
E0	meV	Mean energy of neutrons.	0
dE	meV	Energy spread of neutrons (flat or gaussian sigma).	0
Lambda0	AA	Mean wavelength of neutrons.	0
dLambda	AA	Wavelength spread of neutrons.	0
flux	1/(s*cm**2*st)	Energy integrated flux	1
gauss	1	Gaussian (1) or Flat (0) energy/wavelength distribution	0
compat	1	Apply weighting/sampling as now obsolete Source_flat component	0

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Insert Optics - Guide - of dimension 0.06 x 0.06 m, length 20 m, 1.5 meters along z after Source. Use an m value of 'M'. Name the component.



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Significance of Guide input parms

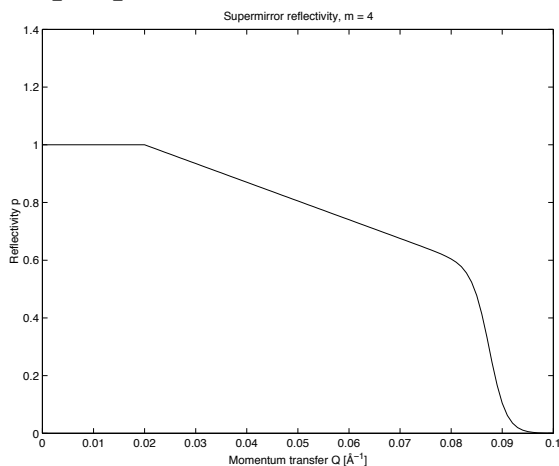


Figure 5.1: A typical reflectivity curve for a supermirror, Eq. (5.2). The used values are **Input parameters** $m = 4$, $R_0 = 1$, $Q_c = 0.02 \text{ \AA}^{-1}$, $\alpha = 6.49 \text{ \AA}$, $W = 1/300 \text{ \AA}^{-1}$.

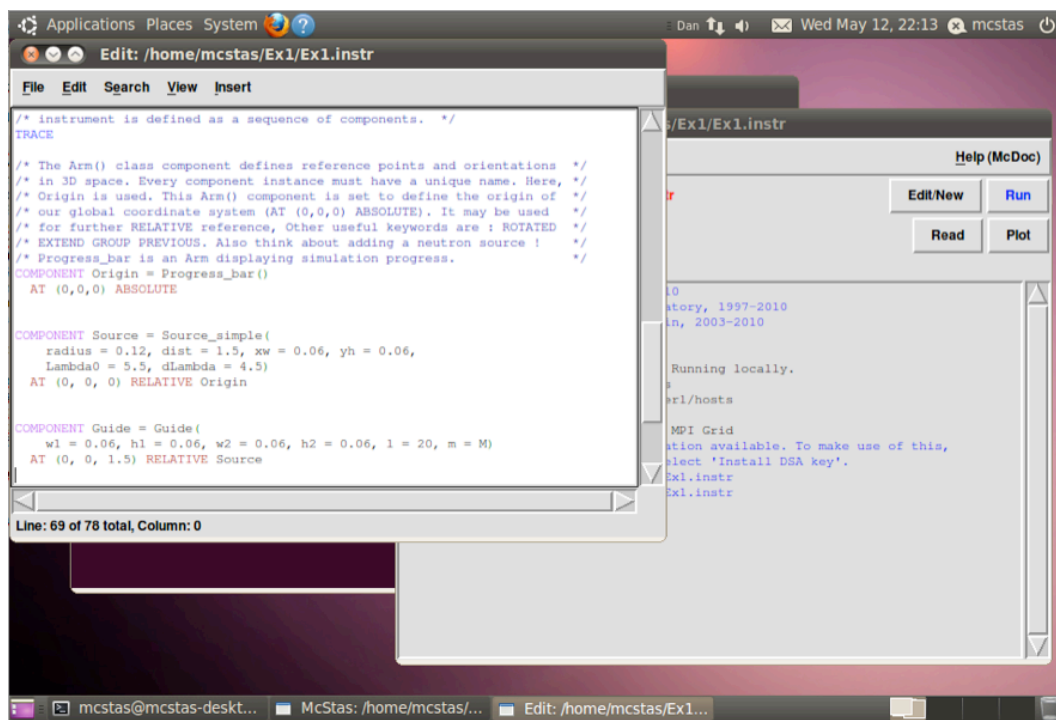
Parameters in **boldface** are required; the others are optional.

Name	Unit	Description	Default
reflect	str	Reflectivity file name. Format [q(Angs-1) R(0-1)]	0
w1	m	Width at the guide entry	
h1	m	Height at the guide entry	
w2	m	Width at the guide exit	
h2	m	Height at the guide exit	
l	m	length of guide	
R0	l	Low-angle reflectivity	0.99
Qc	AA-1	Critical scattering vector	0.0219
alpha	AA	Slope of reflectivity	6.07
m	l	m-value of material. Zero means completely absorbing.	2
W	AA-1	Width of supermirror cut-off	0.003

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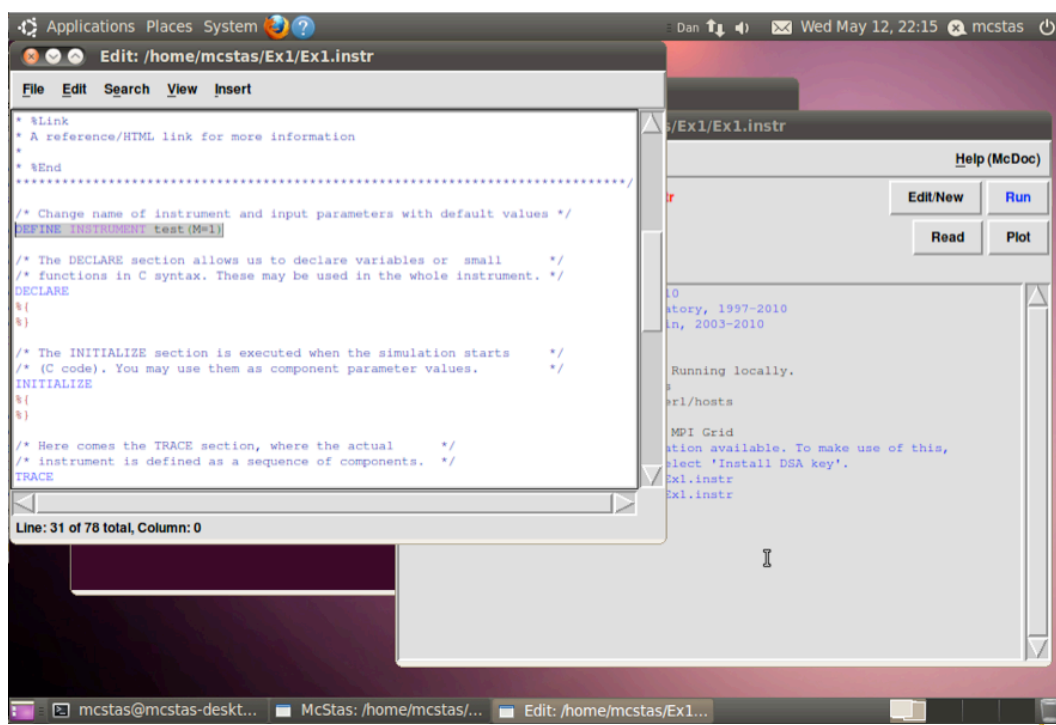


Scroll to the top of the window and locate the DEFINE INSTRUMENT Test(Par1=1) line. Define an input parameter called M, with a default value of 1



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Scroll to the top of the window and locate the DEFINE INSTRUMENT Test(Par1=1) line. Define an input parameter called M, with a default value of 1



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Insert a PSD monitor of dimension 0.07 x 0.07 m, define an output filename, AT (0,0,20.01) RELATIVE Guide

Insert a Divergence monitor of dimension 0.07 x 0.07 m, define an output filename, maximum divergence 5 degrees in both directions. To be placed AT (0,0,0.01) RELATIVE PREVIOUS

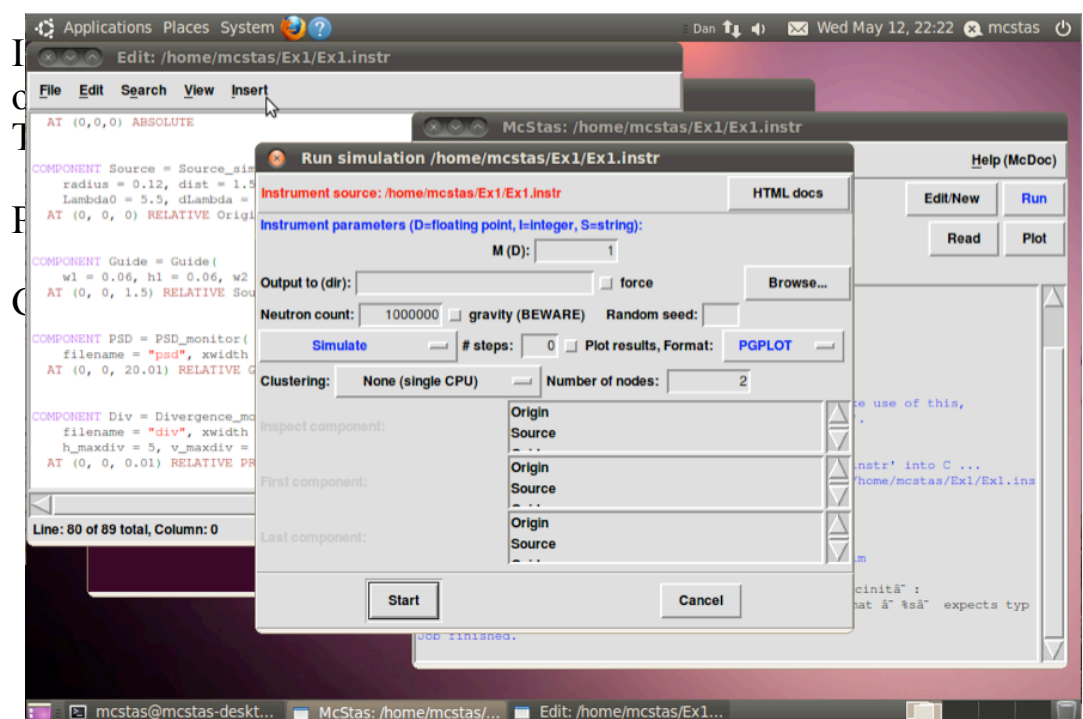
Press save

Go on the main window, press run, you should now get....



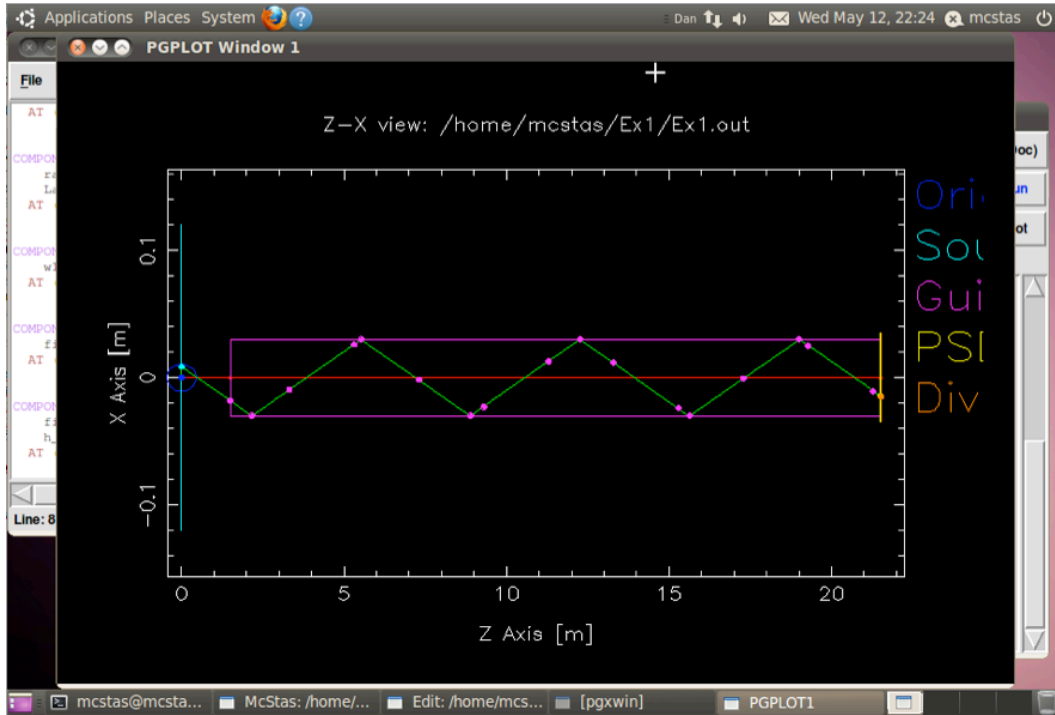
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Insert a PSD monitor of dimension 0.07 x 0.07 m, define an output filename, AT (0,0,20.01) RELATIVE Guide



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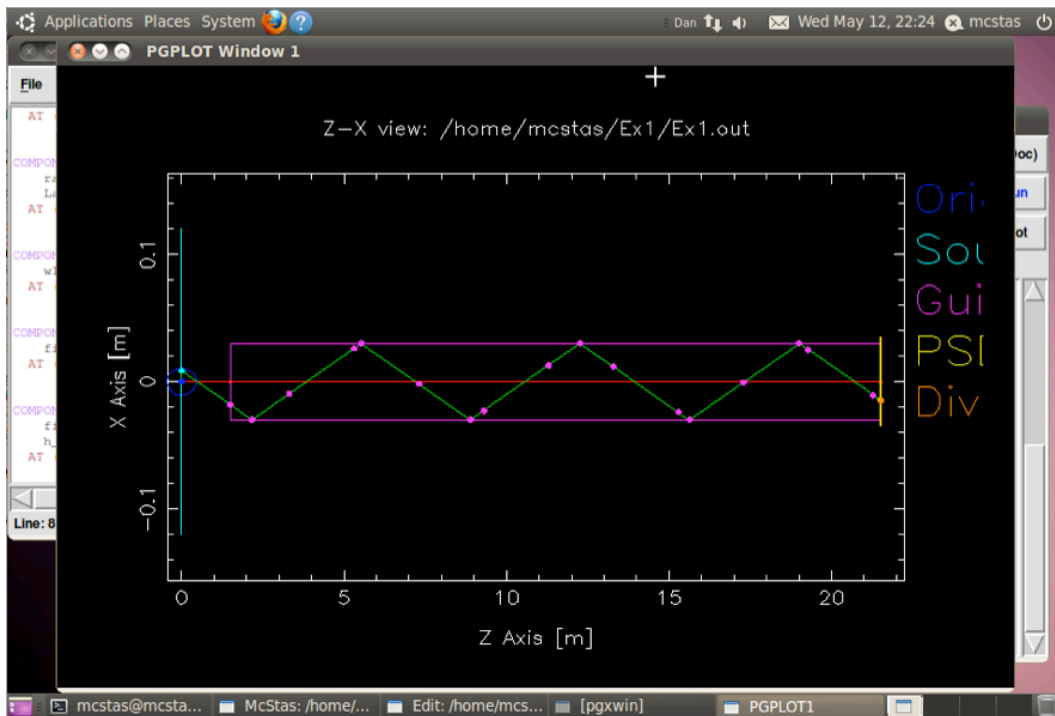
Select the 'TRACE' mode and press Start - you will get a view of the instrument. Try zooming (place cursor, press z, drag, click)



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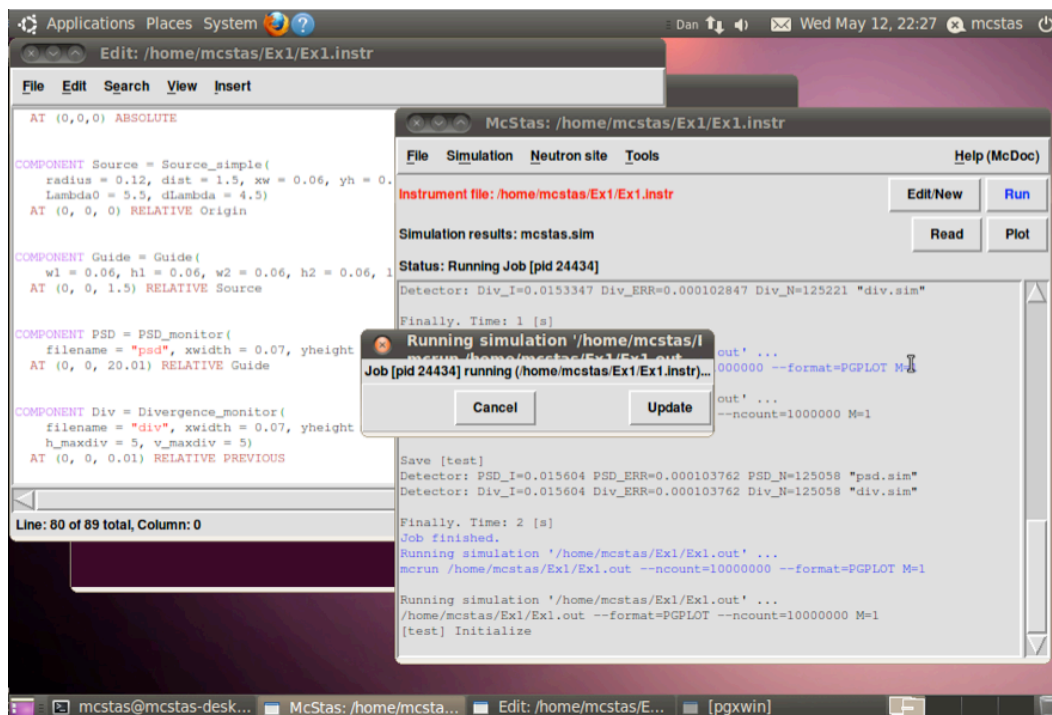
Right-click to unzoom.
Click a few times and see the visualization of neutron rays



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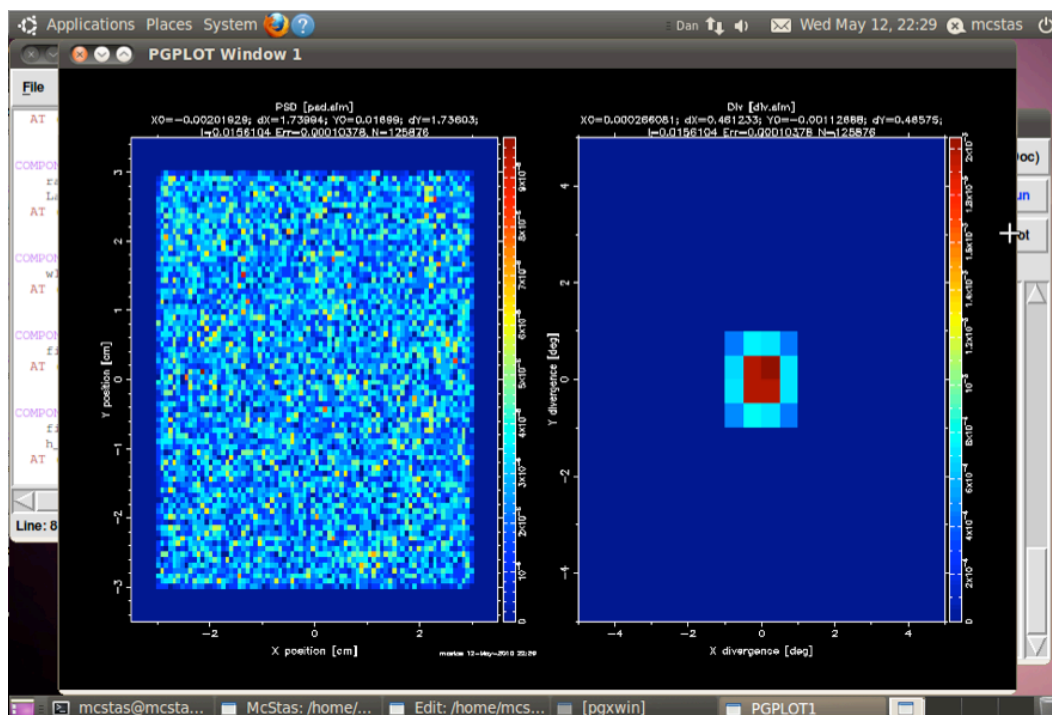
Press 'q' to exit the visualisation, close the window.
Press run again and choose simulate mode, start
Once the simulation terminates, press Plot and you will get...



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Press 'q' to exit the visualisation, close the window.
Press run again and choose simulate mode, start
Once the simulation terminates, press Plot and you will get...



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Clicking one of the panels will zoom that monitor, clicking again zoom out

Shortcut keys:

Click on a plot for full-window view.

Press key for hardcopy (in graphics window), 'Q' to quit

'P' BW postscript

'C' color postscript

'N' PNG file

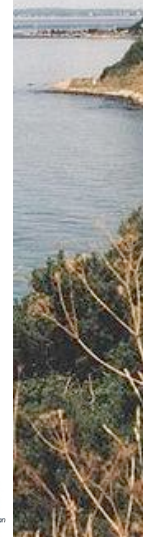
'M' PPM file

'G' GIF file

'L' Toggle log10 plotting mode

'T' Toggle contour plotting mode

'Q' quit



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On the run dialogue, we will now:

- 1) Define an output directory (otherwise subsequent sims will overwrite results)
- 2) Perform a scan by
 - a) Setting 0,6 for the value of M
 - b) Fill the 'steps' field by the number 7

A series (7) of simulations will now run corresponding to:

M=0 - simple, non-reflecting beamtube (absorbing walls)

M=1,6 - Guide mirrors of increasing quality

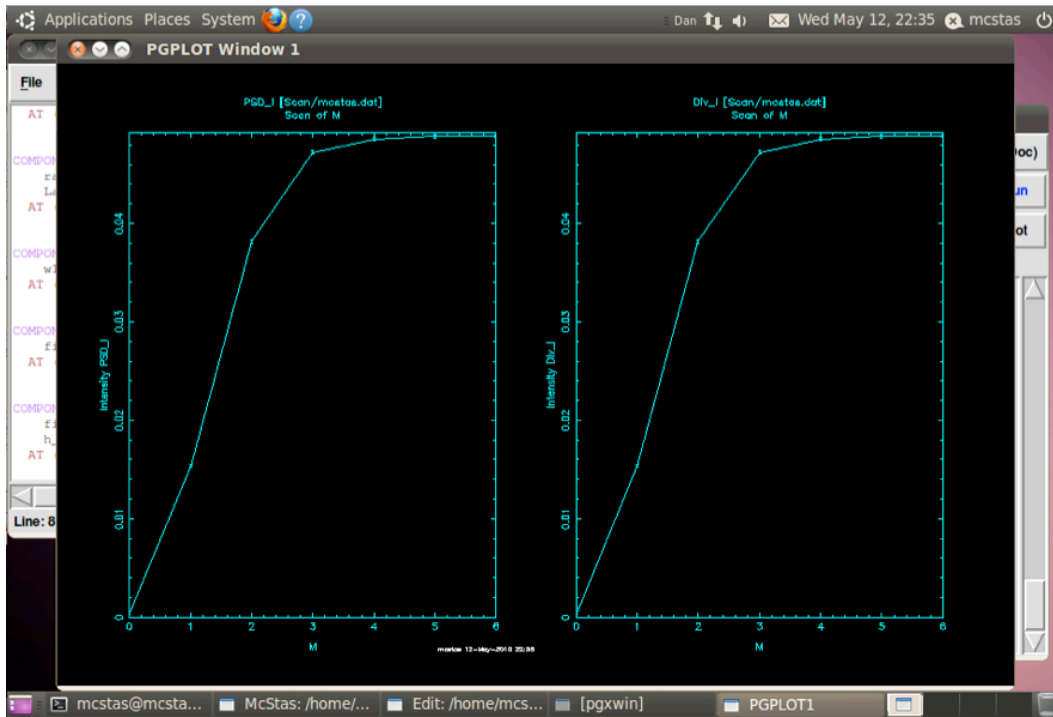
After performing the scan, press Plot and you should get...



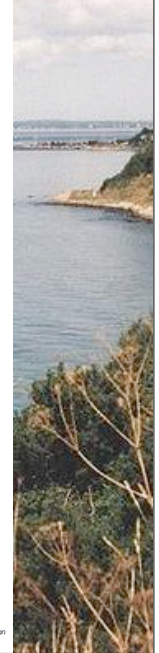
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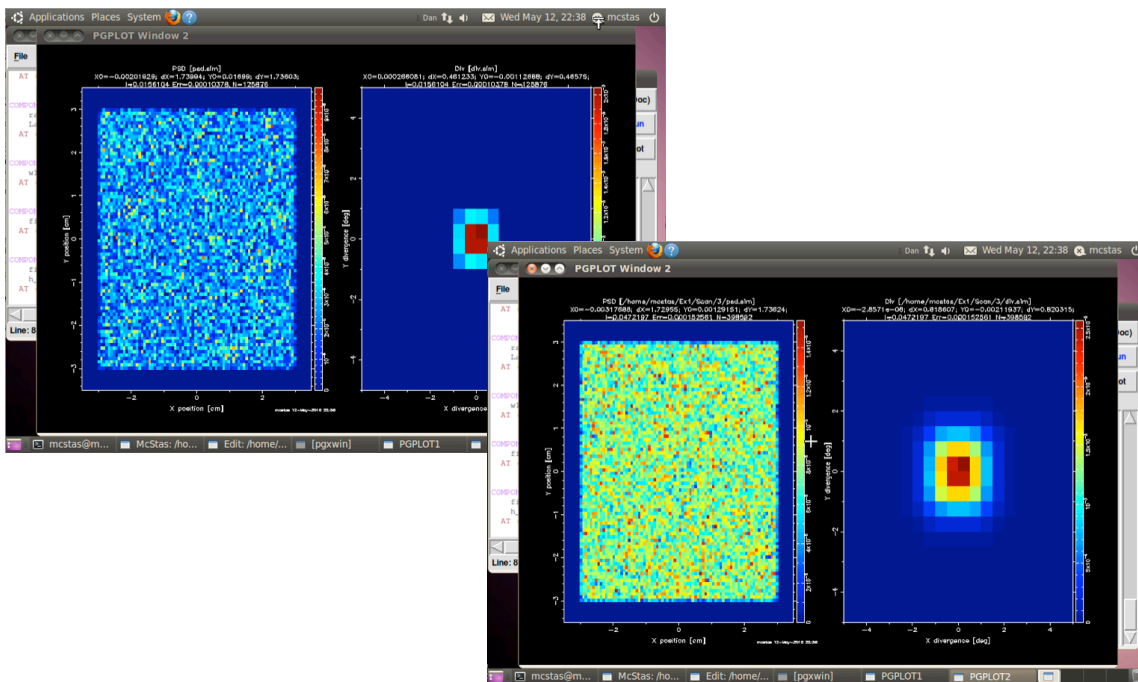
A report of integrated intensity of the monitors, as fct. of the scanned variable



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Try using the Tools - Plot other results to compare the individual scan steps (browse to Scan/0 , Scan/3, ...)



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