STATIONARY BEAM TAILORING

(slits and collimators)

McStas n

McStas School
Bariloche - Argentina

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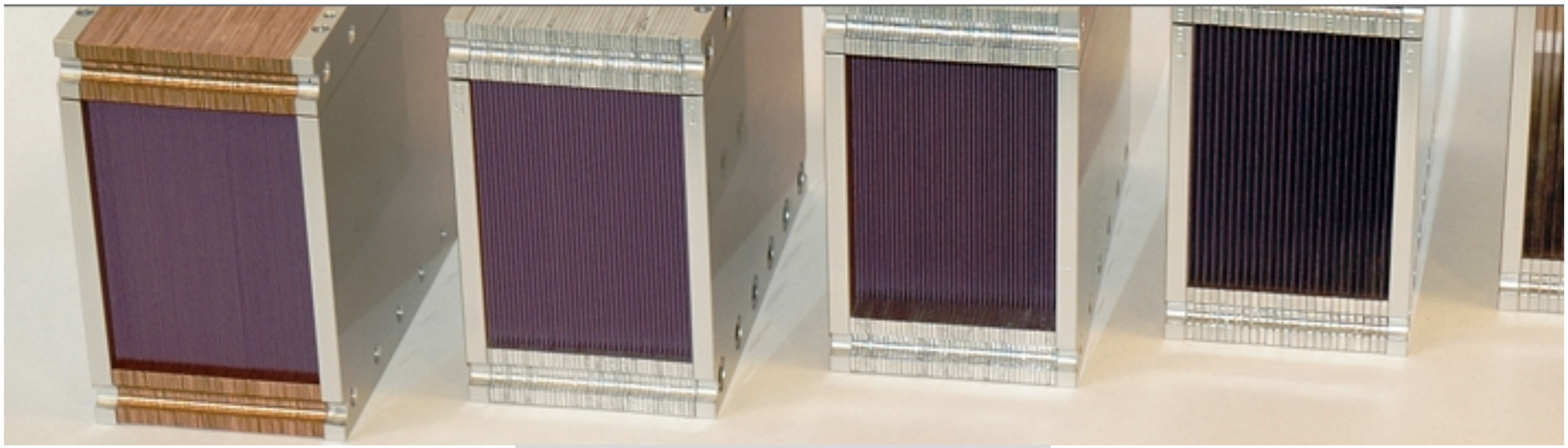

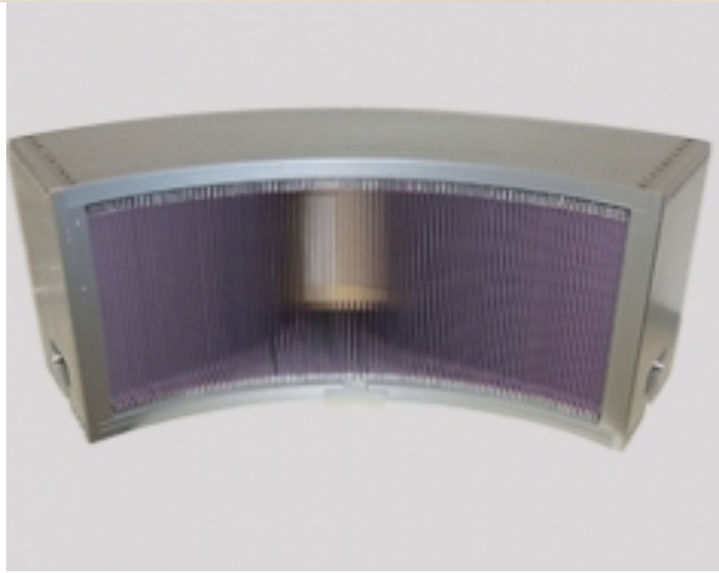

collimator photos from :
http://www.jjxray.dk

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In this session:

- Overview of existing Slit and Collimator components
- Detailed description of the most commonly used ones
- How to 'call' them into a *.instr file
- Practical Exercise using Collimators

IMPORTANT:

All (and more) of this information can be found in the online pdf component documentation
http://www.mcstas.org/documentation/manual/mcstas-2.2a-components.pdf

also distributed with your McStas installation

The component documentation along with the "*mcdoc component_you_are_searching_for*" command, are your best friends when using McStas

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Slit (and slit-like) components:

- Slit.comp
- Beamstop.comp
- CavitiesIn.comp
- CavitiesOut.comp

Collimators:

- Collimator_linear.comp
- Collimator_radial.comp
- Collimator_ROC.comp
- Exact_radial_coll.comp

SLITS

Slit.comp

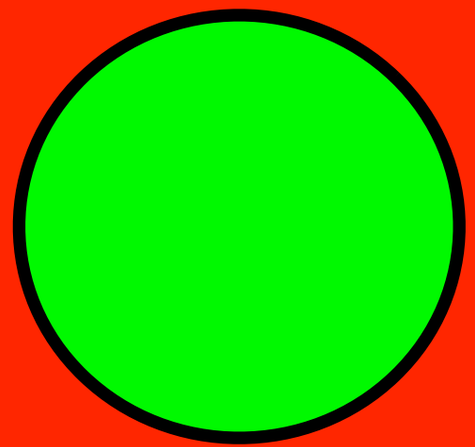
A beam defining diaphragm

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

Name	Unit	Description	Default
xmin	m	Lower x bound	-0.01
xmax	m	Upper x bound	0.01
ymin	m	Lower y bound	-0.01
ymax	m	Upper y bound	0.01
radius	m	Radius of slit in the z=0 plane, centered at Origo	0
cut	1	Lower limit for allowed weight	0
xwidth	m	Width of slit. Overrides xmin,xmax.	0
yheight	m	Height of slit. Overrides ymin,ymax.	0

Example:

```
COMPONENT input_slit = Slit(xmin=-0.01, xmax=0.01, ymin=-0.01,
                            ymax=0.01)
```



SLITS

Beamstop.comp

A neutron absorbing area

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

Name	Unit	Description	Default
xmin	m	Lower x bound	-0.05
xmax	m	Upper x bound	0.05
ymin	m	Lower y bound	-0.05
ymax	m	Upper y bound	0.05
xwidth	m	Width of beamstop (x). Overrides xmin,xmax.	0
yheight	m	Height of beamstop (y). Overrides ymin,ymax.	0
radius	m	radius of the beam stop in the z=0 plane, centered at Origo	0

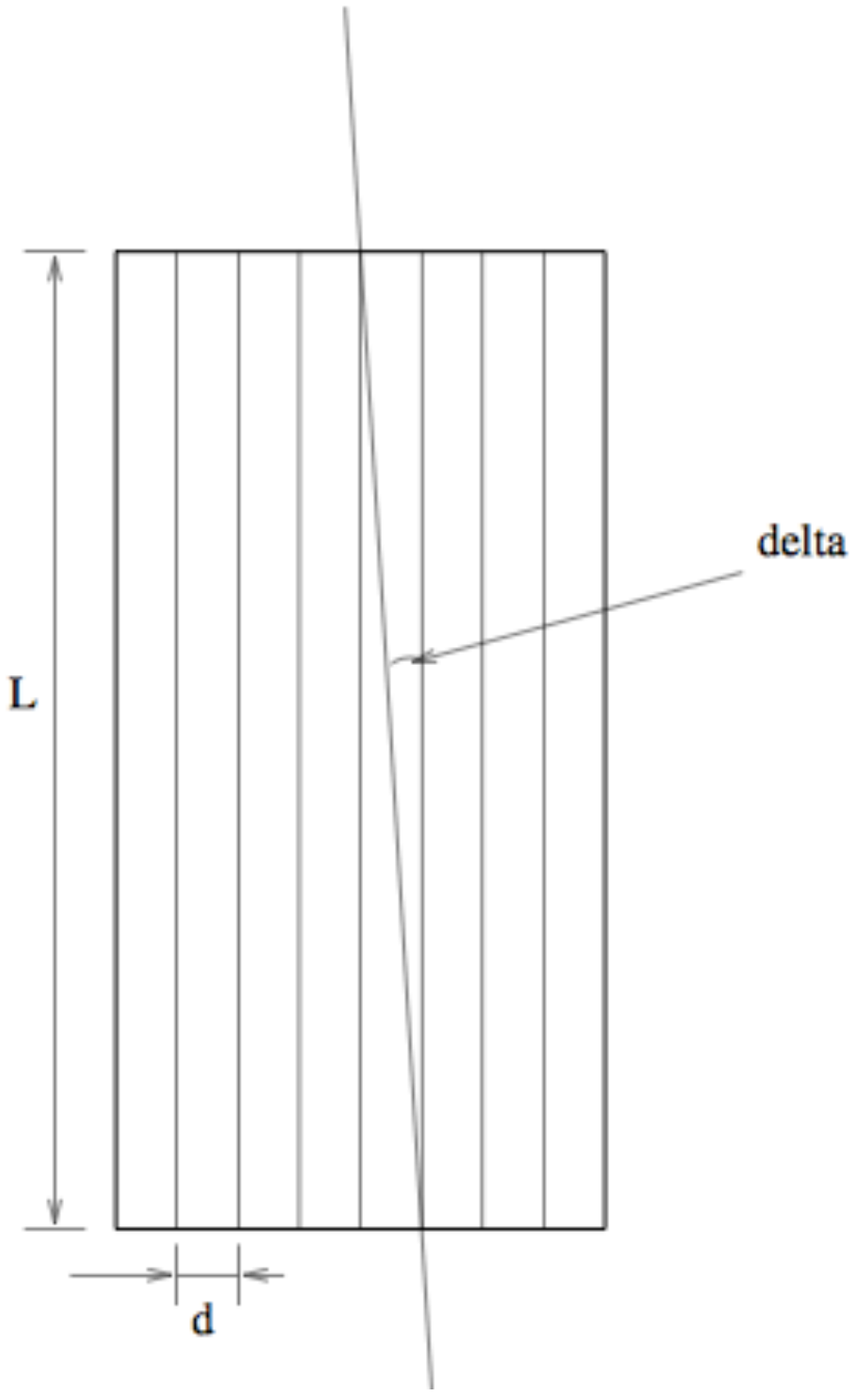
Example:

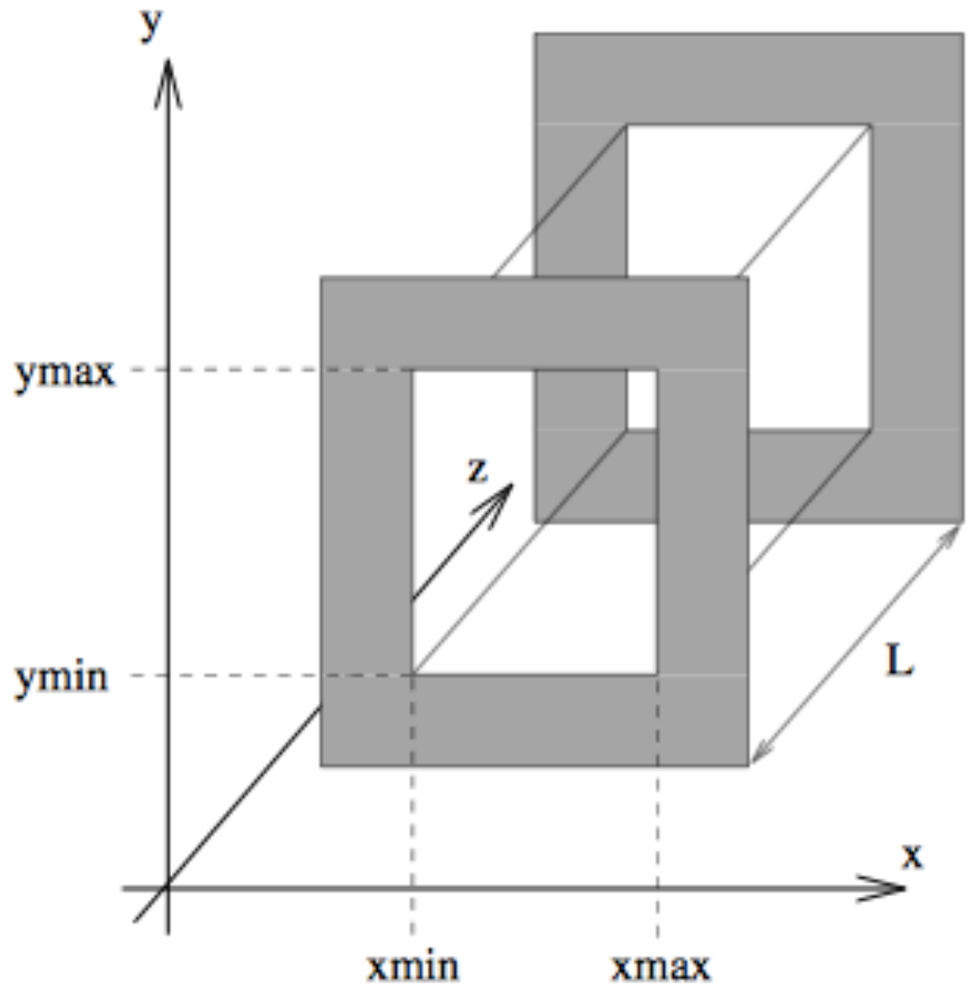
```
COMPONENT stopbeam = Beamstop(xmin=-0.01, xmax=0.01, ymin=-0.01,
                              ymax=0.01)

COMPONENT stopbeam = Beamstop(radius=0.01)
```

COLLIMATORS

Collimator_linear.comp

A simple Soller blade collimator





COLLIMATORS

Collimator_linear.comp

A simple Soller blade collimator

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

Name	Unit	Description	Default
xmin	m	Lower x bound on slits	-0.02
xmax	m	Upper x bound on slits	0.02
ymin	m	Lower y bound on slits	-0.05
ymax	m	Upper y bound on slits	0.05
xwidth	m	Width of slits	0
yheight	m	Height of slits	0
length	m	Distance between input and output slits	0.3
divergence	minutes of arc	Divergence horizontal angle (calculated as atan(d/length), where d is the blade spacing)	40
transmission	1	Transmission of Soller (0<=t<=1)	1
divergenceV	minutes of arc	Divergence vertical angle	0

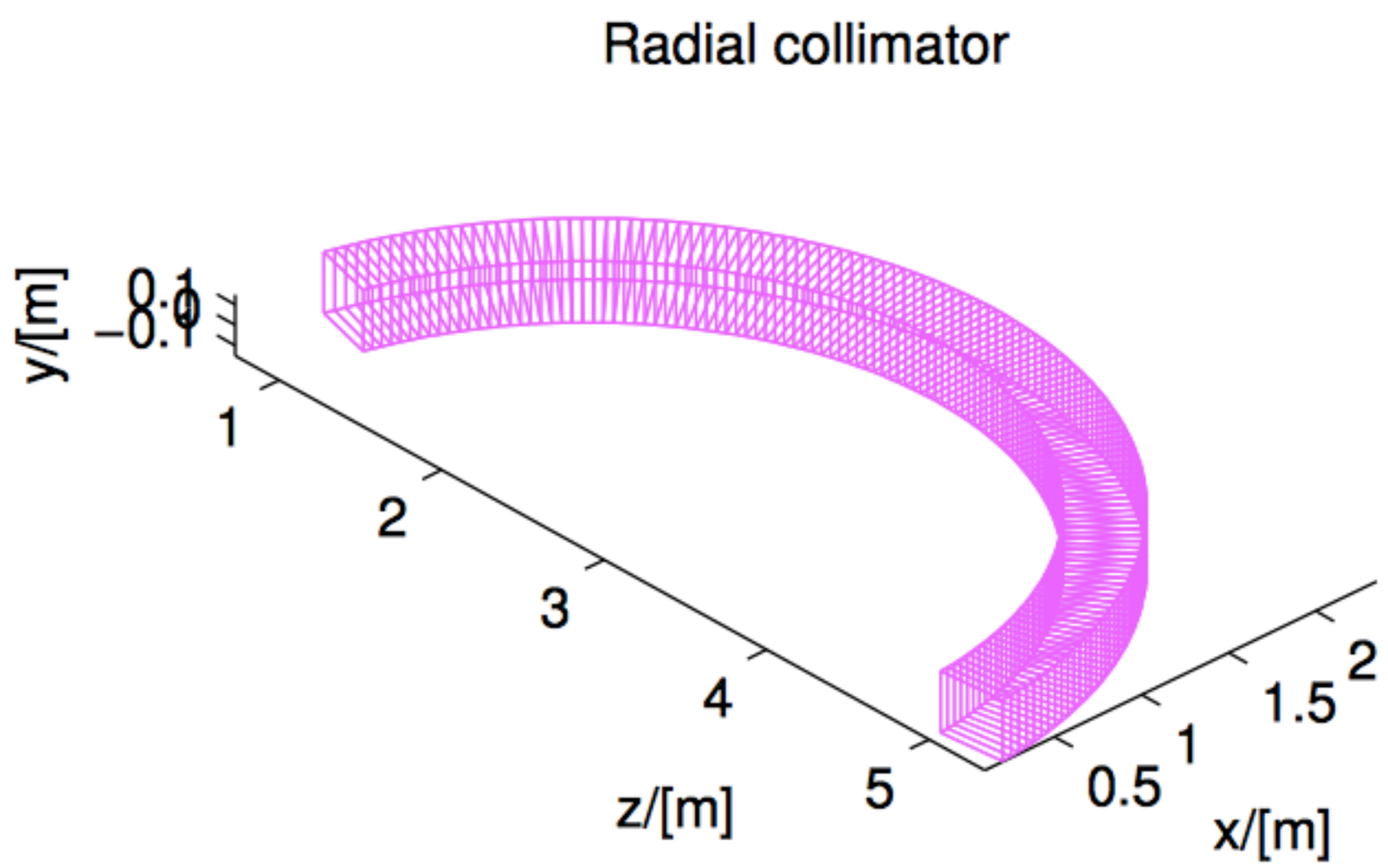
Example:

```
COMPONENT lin_coll = Collimator_linear(xmin=-0.1, xmax=0.1, ymin=-0.1,
                     ymax=0.1,length=0.25,
                     divergence=40,transmission=0.7)
```

COLLIMATORS

Collimator_radial.comp

A radial Soller blade collimator



COLLIMATORS

Collimator_radial.comp — A radial Soller blade collimator

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

Name	Unit	Description	Default
xwidth	m	Soller window width, filled with nslit slits. Use 0 value for continuous collimator.	0
yheight	m	Collimator height.	.3
length	m	Length/Distance between inner and outer slits.	.35
divergence	min of arc	Divergence angle. May also be specified with the nslit parameter. A zero value unactivates component.	0
transmission	1	Maximum transmission of Soller (0<=t<=1).	1
theta_min	deg	Minimum Theta angle for the radial setting.	5
theta_max	deg	Maximum Theta angle for the radial setting.	165
nchan	1	Number of Soller channels in the theta range. Use 0 value for continuous collimator.	0
radius	m	Radius of the collimator (to entry window).	1.3
nslit	1	Number of blades composing each Soller. Overrides the divergence parameter.	0
roc	deg	Amplitude of oscillation of collimator. 0=fixed.	0
verbose	0/1	Gives additional information.	0
approx	0/1	Use Soller triangular transmission approximation.	0

Example:

```
COMPONENT rad_coll = Collimator_radial(xwidth=0.015, yheight=0.3,
                     length=0.35, divergence=40.0, transmission=1,
                   theta_min=5, theta_max=165, nchan=128, radius=0.9)
```

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EXERCISE

- Open the existing instrument file named '*Test_Collimator_Radial_ex.instr*' (you will find it in today's class folder)

- This instrument file compares the performance of the '*Collimator_Radial*' and '*Collimator_ROC*' components. The user is requested to give an input parameter: 1 for choosing the radial collimator and 2 for using the ROC collimator.
- Before running the instrument file, spend some time reading it and understanding what components it calls and what it does:

  - What source is used? What type of monitors are used and what do they do?
  - What is the functionality of the following lines placed after the sample component?

```
EXTEND %{
  if (!SCATTERED) ABSORB;
%}
```

  - The file contains 2 collimator components!! Notice after each one of them the usage of a '*WHEN* ...' statement. What does that do? (HINT: take a look at the content of the '*INITIALIZE*' part of the file.)

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EXERCISE

- Run the '*Test_Collimator_Radial_ex.instr*' with 1e7 neutrons
  a) with Collimator =1 (i.e. using the Collimator_radial component)
  b) with Collimator = 2 (i.e. using the Collimator_ROC component)
  Compare the results. Do the two different collimators perform similarly?
- Expand the '*Test_Collimator_Radial_ex.instr*' file, adding a third options, where the file uses the '*Exact_Radial_Coll.comp*' component, when the parameter Collimator=3. How does this collimator perform, compered to the previous 2?