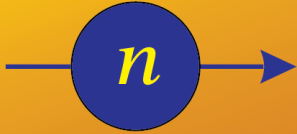


McStas



McStas School
Bariloche - Argentina

15th-19th
FEBRUARY
2016

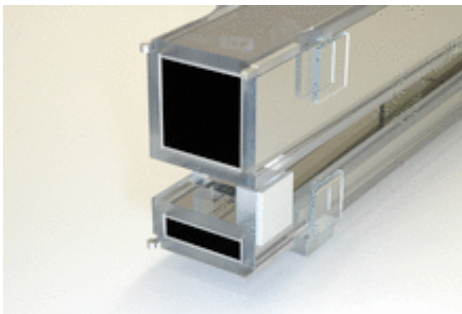
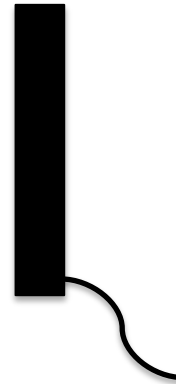
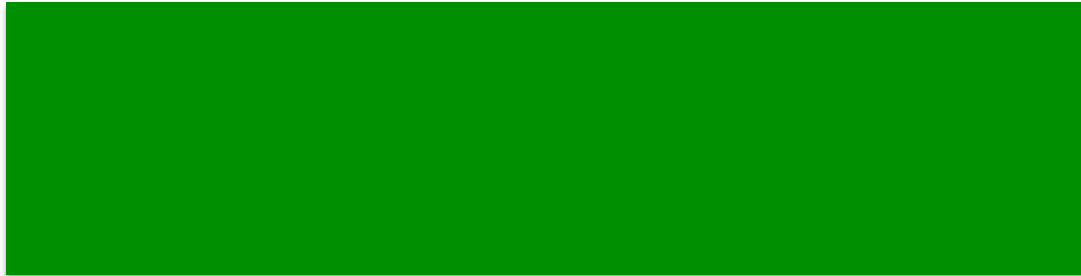
3 - Guides

- Straight guide
- Curved guide
- Ballistic guide

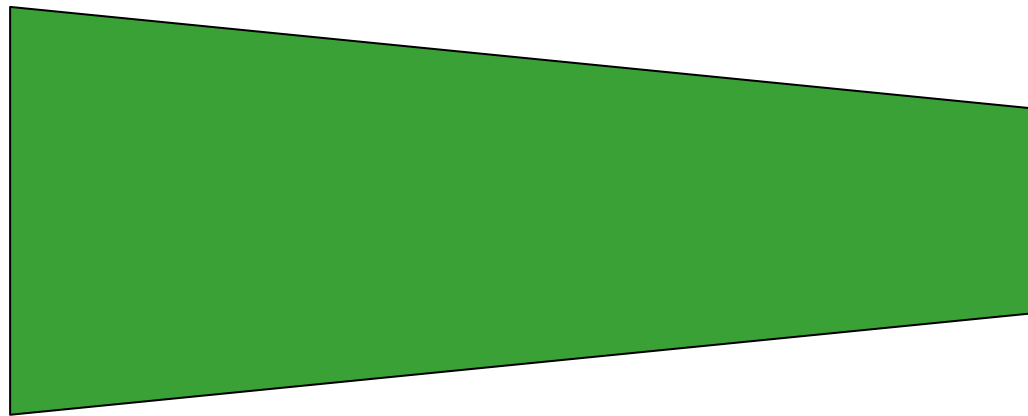
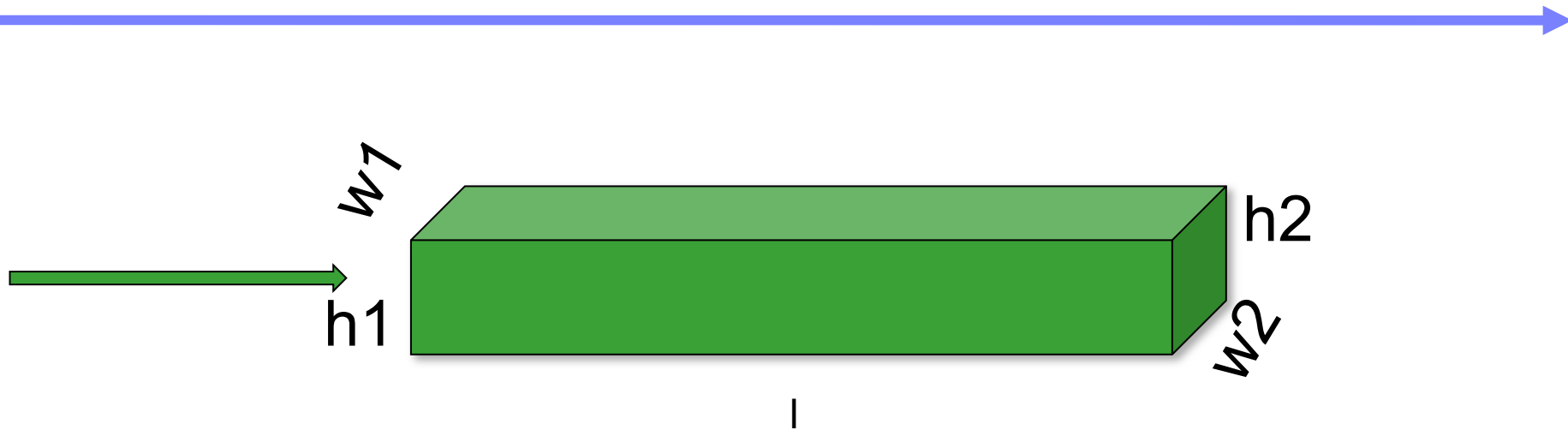


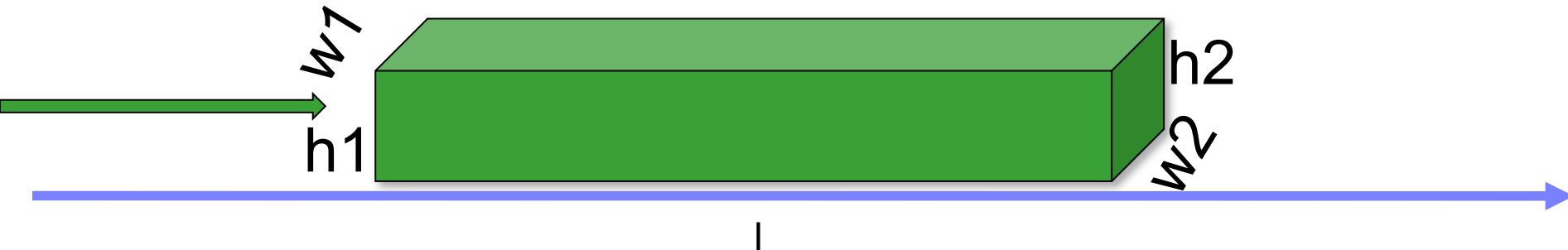
GUIDES

Neutron Transport



STRAIGHT GUIDE



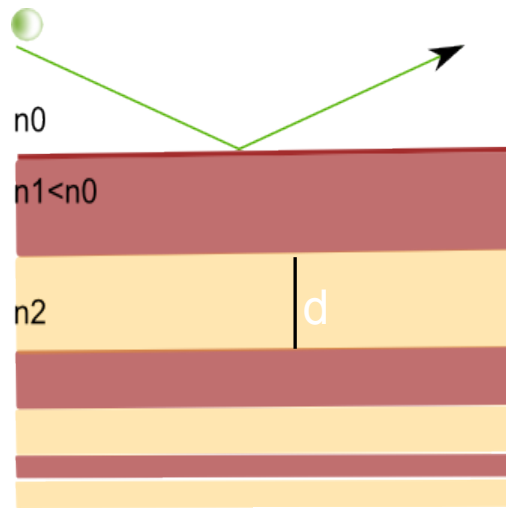


Parameters in **boldface** are required; the others are optional.

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	1	Low-angle reflectivity	0.99
Qc	AA-1	Critical scattering vector	0.0219
alpha	AA	Slope of reflectivity	6.07
m	1	m-value of material. Zero means completely absorbing.	2
W	AA-1	Width of supermirror cut-off	0.003

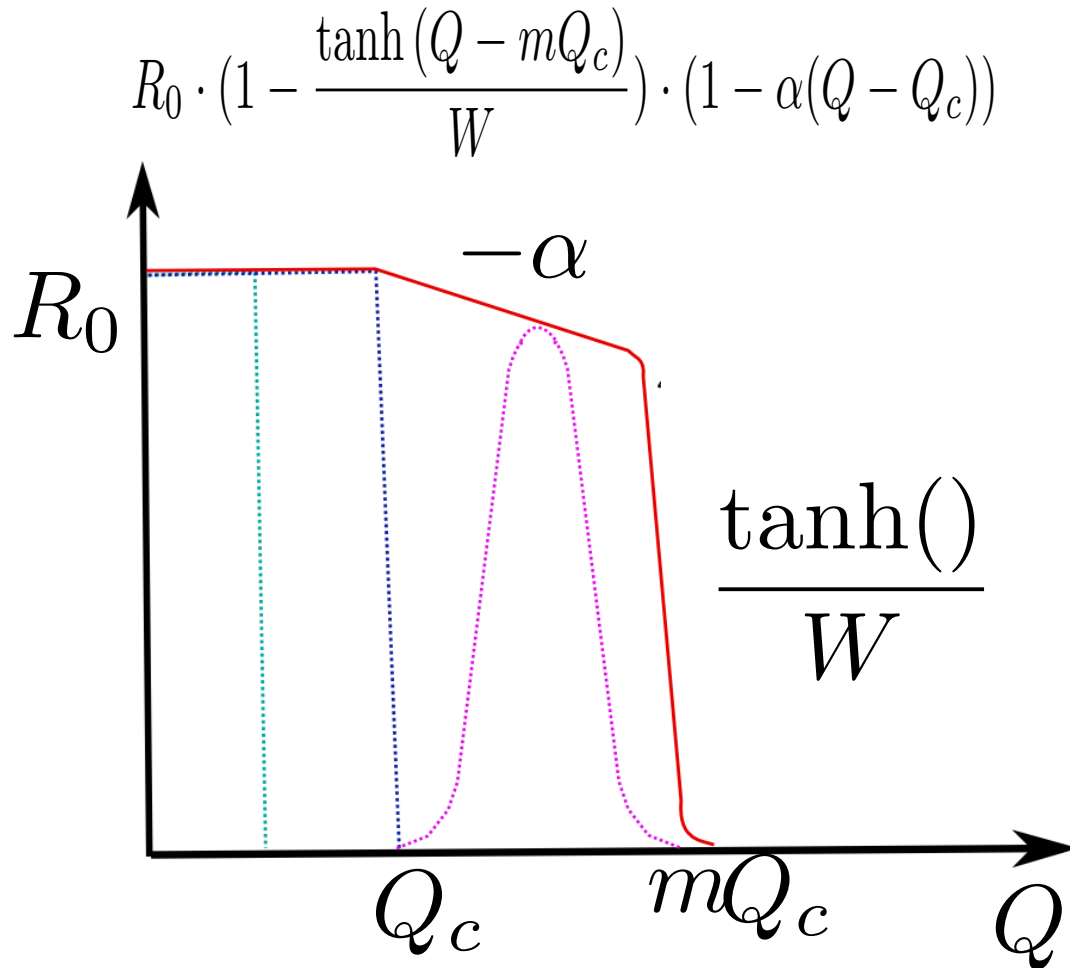


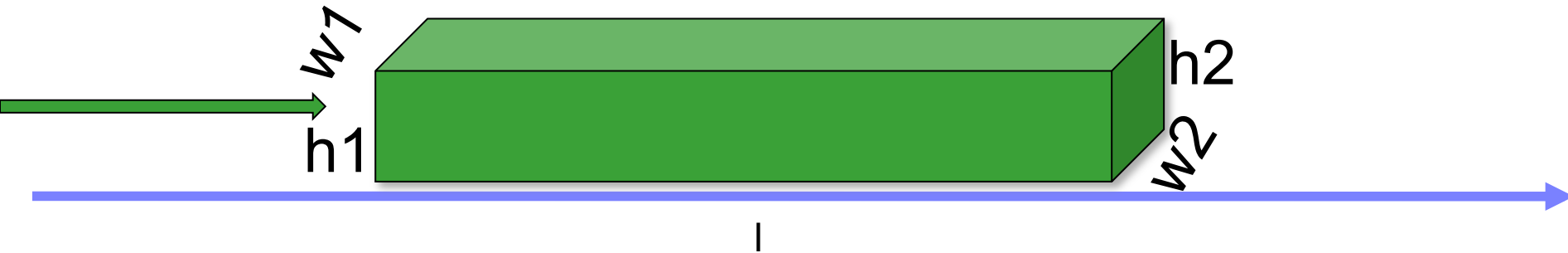
Supermirror Coating



$$V = \frac{2\pi\hbar^2}{m} bN \quad \sin\theta < \sqrt{\frac{mV}{2\pi^2\hbar^2}} \lambda$$

$$m = \frac{\theta_{mirror}}{\theta_{Ni}}$$





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	1	Low-angle reflectivity	0.99
Qc	AA-1	Critical scattering vector	0.0219
alpha	AA	Slope of reflectivity	6.07
m	1	m-value of material. Zero means completely absorbing.	2
W	AA-1	Width of supermirror cut-off	0.003

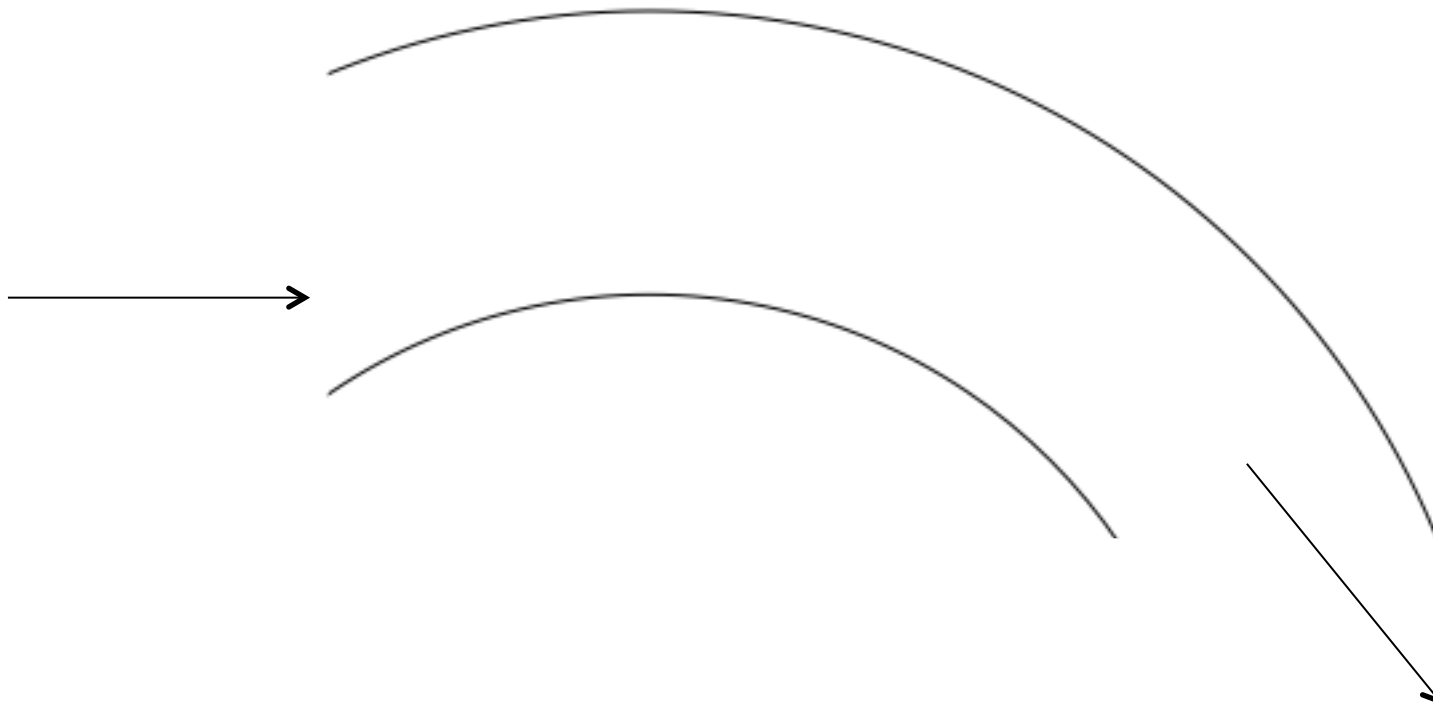


GUIDE DESIGN



CURVED GUIDES

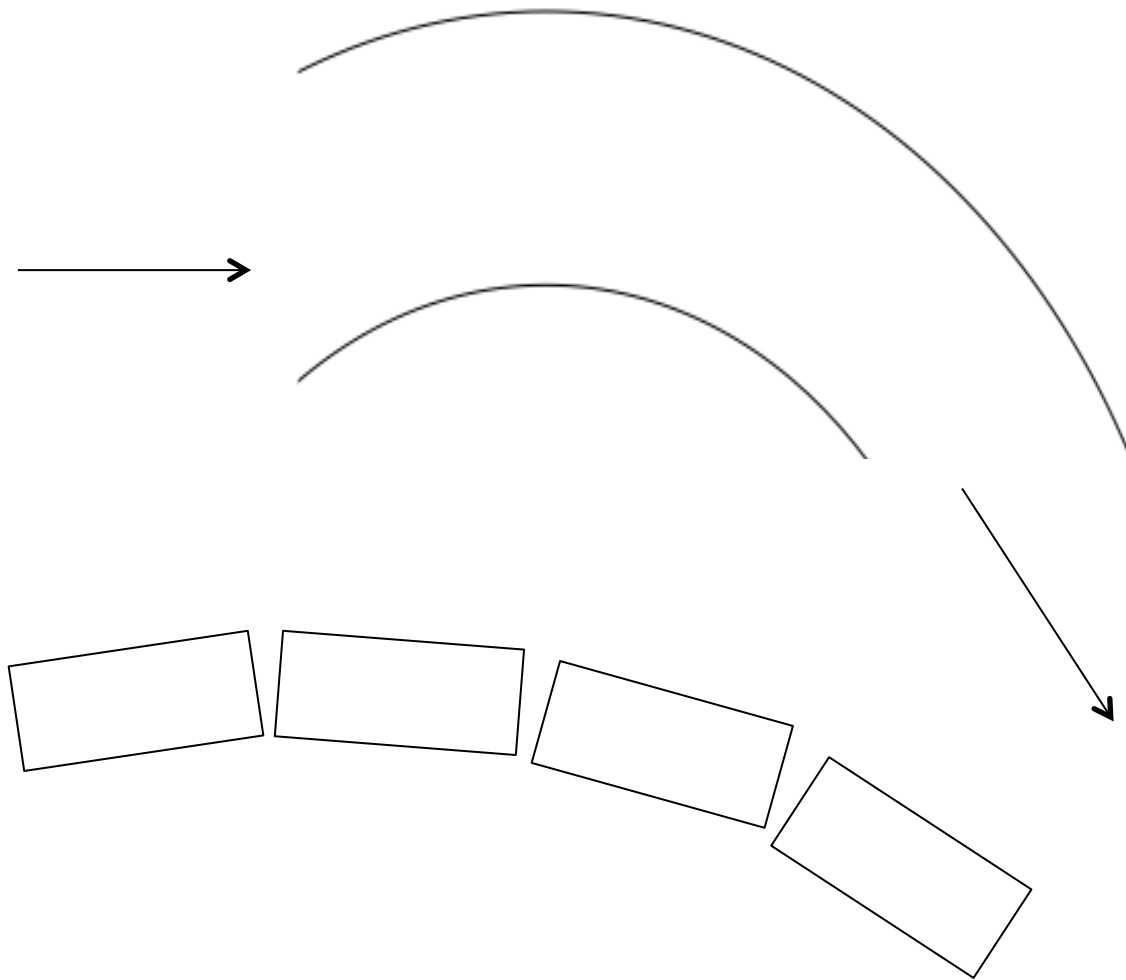
Getting out of direct line of sight



1 reflection per neutron mandatory to come out the other side of the guide

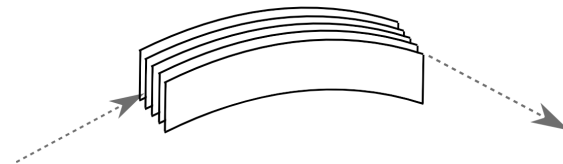


CURVED GUIDES



... in McStas

- Use straight guides & rotation
- Bender.comp
- curvedGuide.com



CURVED GUIDES

- Open the instrument file **Ex_3_1_curved.instr** given to you
- Study the instrument file, notice use of the PREVIOUS keyword
- Notice input parameters of guide m-value, angular rotation of guide segments
- Question: What is the relevant rotation angle to achieve a guide curvature of 1 km?
- Try performing a TRACE
- Try varying the guide curvature, notice effect on divergence and beam profile

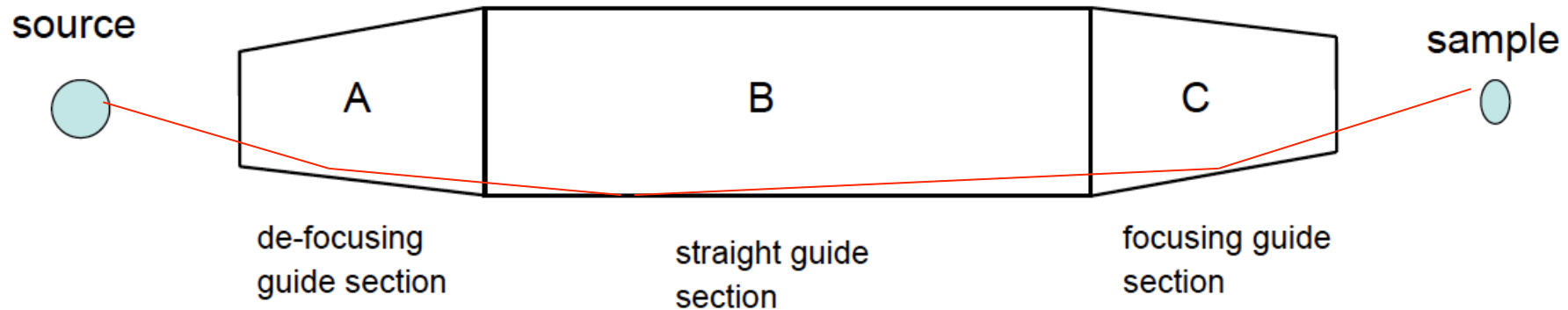
Other curved guides:

Use McDoc -> Component Library Index to look at Guide_curved plus Bender from the McStas lib





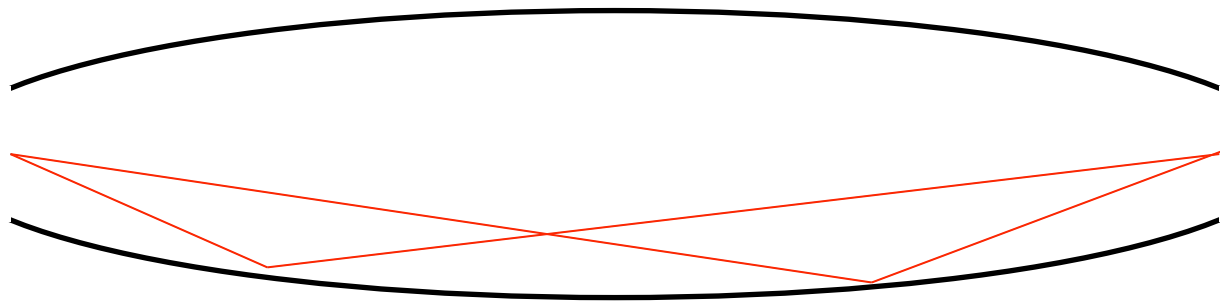
BALLISTIC GUIDE



Goal: high flux on sample



ELLIPTIC GUIDE



Few reflections - for transport loss in reflection of next session

Focus on samples



OTHER McStas GUIDES

Elliptic_guide_gravity.comp

Guide_anyshape.comp

Guide_channeled.comp

Guide_curved.comp

Guide_four_side_10_shells.comp

Guide_four_side_2_shells.comp

Guide_four_side.comp

Guide_gravity.comp

Guide_honeycomb.comp

Guide_tapering.comp

Guide_wavy.comp

Guide.comp

Pol_guide_vmirror.comp

Have fun with elliptic guides

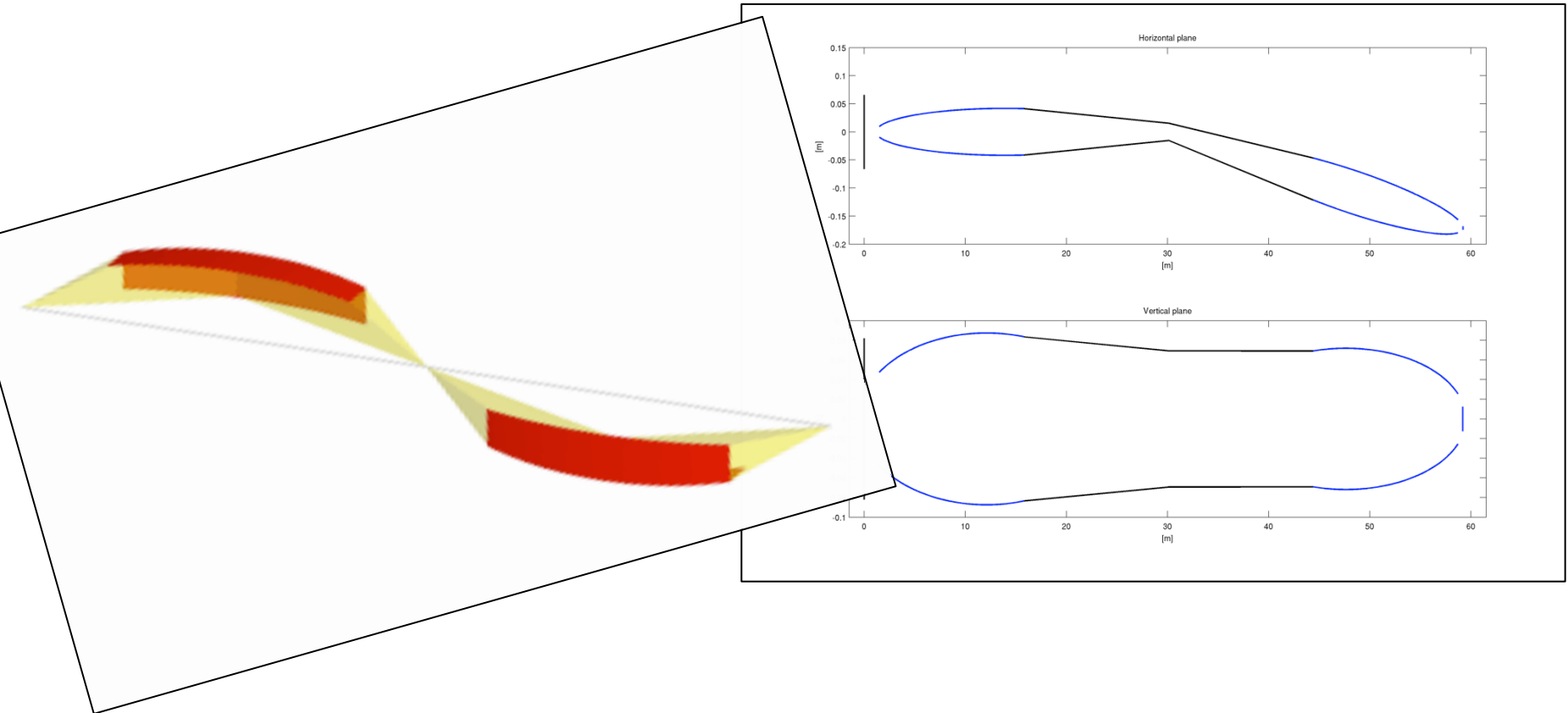
Add gravity to your simulation

Think of fantastic shapes and import their .OFF description

Curious? Lost? Need help?
Try \$ mcdoc or visit <http://mcstas.org/download/components>

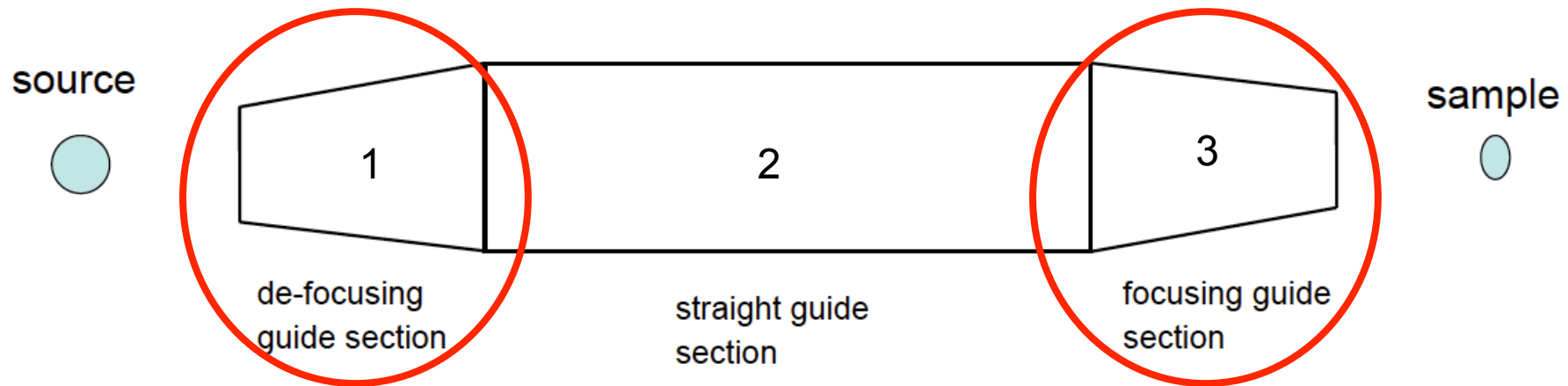


...stir and combine...



BALLISTIC GUIDE

Ex_3_2_ballistic.instr



BALLISTIC GUIDE

- **Open the instrumentfile Ex_3_2_ballistic.instr given to you**
- Study the instrumentfile, notice use of the DECLARE and INITIALIZE sections
- Notice the use of Source_gen to describe the PSI cold source
- Notice the input parameter sa_pos, to vary the guide – sample position distance.
- Notice guide2. What exit(entry) dimensions do guide1 & 3 need?
- **Insert guide1** with an entry opening of $w1=0.03\text{m}$, $h1=0.1\text{m}$, length 3 m at 0.5m from a1
- **Insert guide3** with an exit opening of $w2=0.03$, length 3 m at 33.5m from a1
- For both guides, use the coating parameters from guide2



BALLISTIC GUIDE



- Compile and TRACE to have an **overview of the instrument.**
- **Run a simulation** and notice the wavelength distribution before and after guide.
- **Task:** Scan sa_pos between 0 and 1 m in 11 steps. Notice the effect on beam profiles and divergence.





