Background estimate: what is background ?

Background is … everything you do not want to see.

Origin of background:

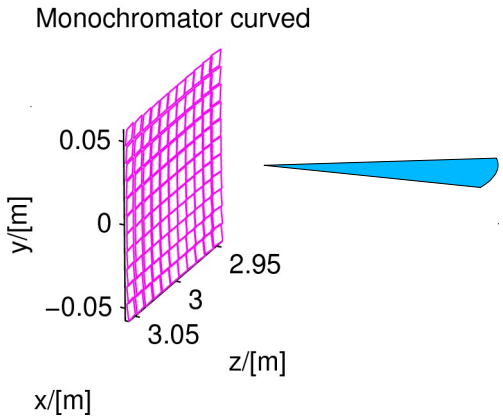
- Fast neutrons, gamma rays …
- Scattering from any unwanted part in the beam
- Mechanics, dust, hydrogenated molecules, …
- Sample environment

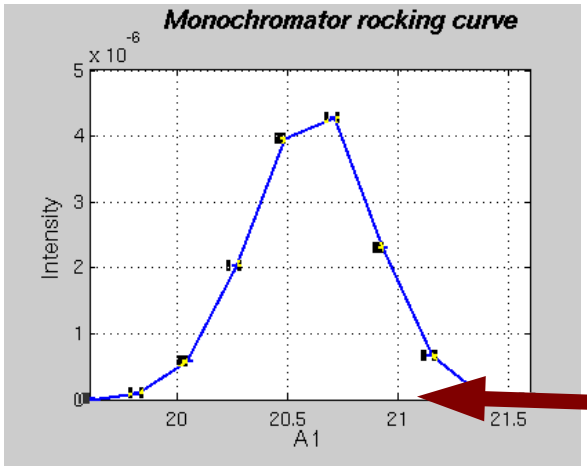
Appears usually as a low level signal, below measurement.
It has no reason to be constant...

Background estimate: mechanics contribution

Monochromators are used to extract a
sharp neutron energy distribution from a white beam.
Rely on Bragg's law.

Use single crystal assembly, with focusing geometry.
Size: Typically 20x20 cm

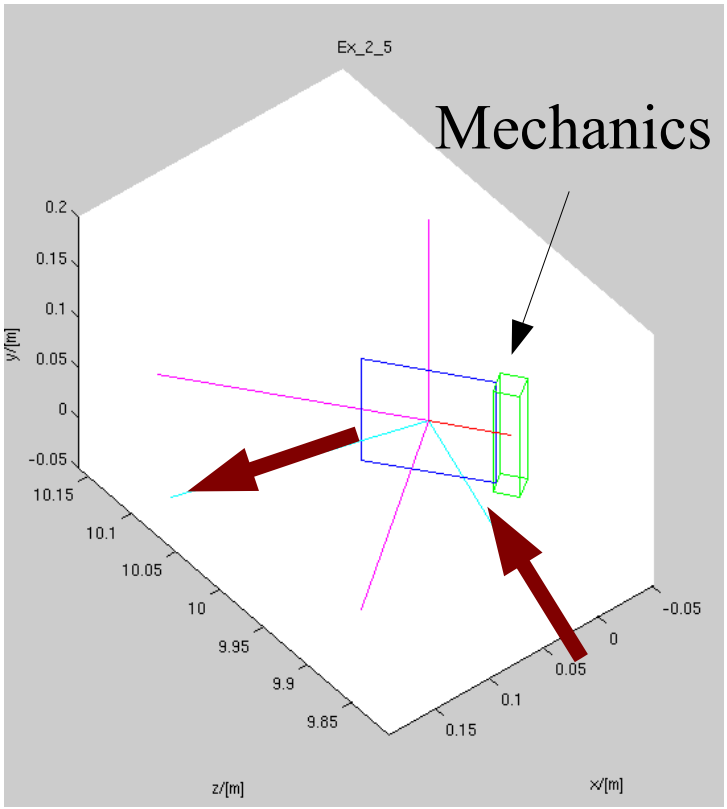




Optics mechanics DO scatter, and may be massive

Background estimate: monochromator simulation

We shall insert a piece of metal next to the monochromator, and a dedicated monitor to record only neutrons scattered from this piece.



1) Get the *Ex_2_1_4* example
2) Define a new instrument input 'string' parameter 'mount' that will specify the material, set as « Al.laz » as default
3)Define a '*flag_mechanics*' variable in the *DECLARE* block
4) Add a *PowderN* instance at 6 cm from the Monochromator, as a 2x2x10 cm bar
5) *Make it so* that it sets the '*flag_mechanics*' to 1 when neutron has scattered
6) Add a sphere detector that records only *flag_mechanics* neutrons

Background estimate: exercise

We shall now use that instrument

1) Run the simulation with 1e7 neutrons and Aluminium mount in directory '*Al*'
2) Repeat with mount=Cu.laz (copper) in directory '*Cu*'
3) Compare the parasitic Bragg peaks and the background level. *Which is best ?* You may press the '***L***' key to toggle log-scale
4) Wavelength is around λ=4 Angs. What will happen for faster neutrons ?