Detector simulations with *McStas*

what we can do today

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Detector model: gas and wires

Realistic detector model based on collaboration with T. van Vuure (2005)

- mixture of thermal-neutron converter gas and stopping gas (CF4, C3H8, CO2, Xe/TMA or He)
- wire detection (incl. charge drift, parallax, ...)
- geometry: tube, PSD plate and banana

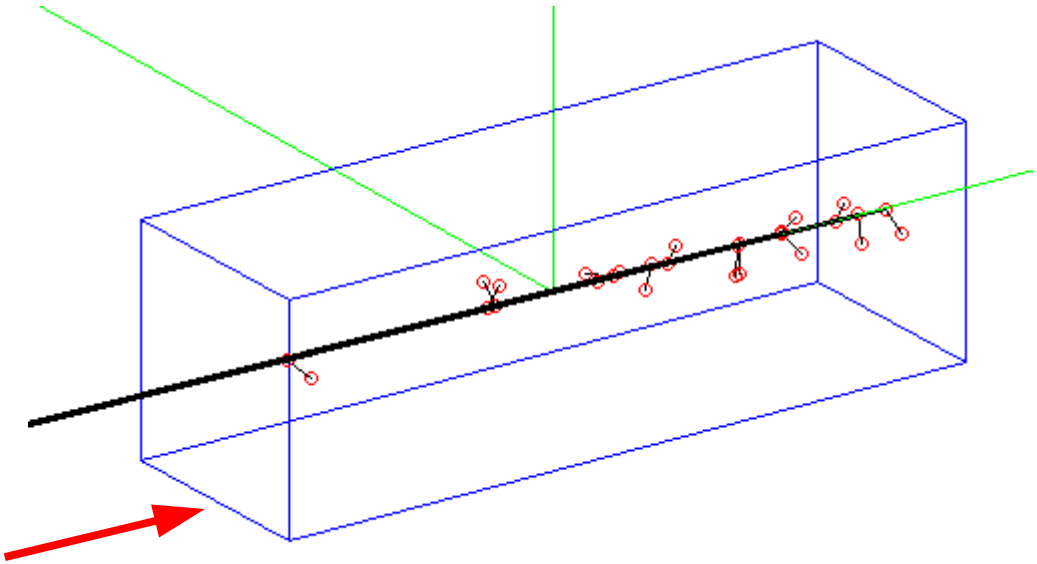
The detection volume can be inserted within any housing (Fe, Al, ...).

Not included: dead time, imperfections from electronics.

Example 1: simple needle beam

Zero divergence beam, detector rotated by 2 deg from perp. View.

Detection area 1x1 cm, He 5 bars, CF4 1 bar.



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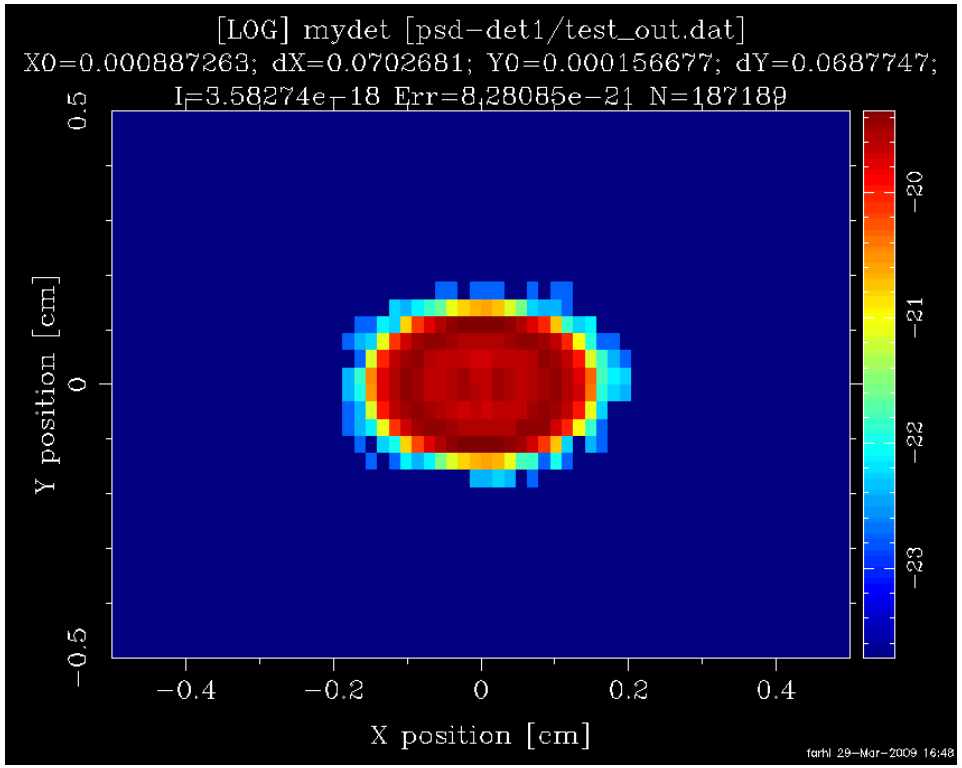


Example 2: D16 MILAND

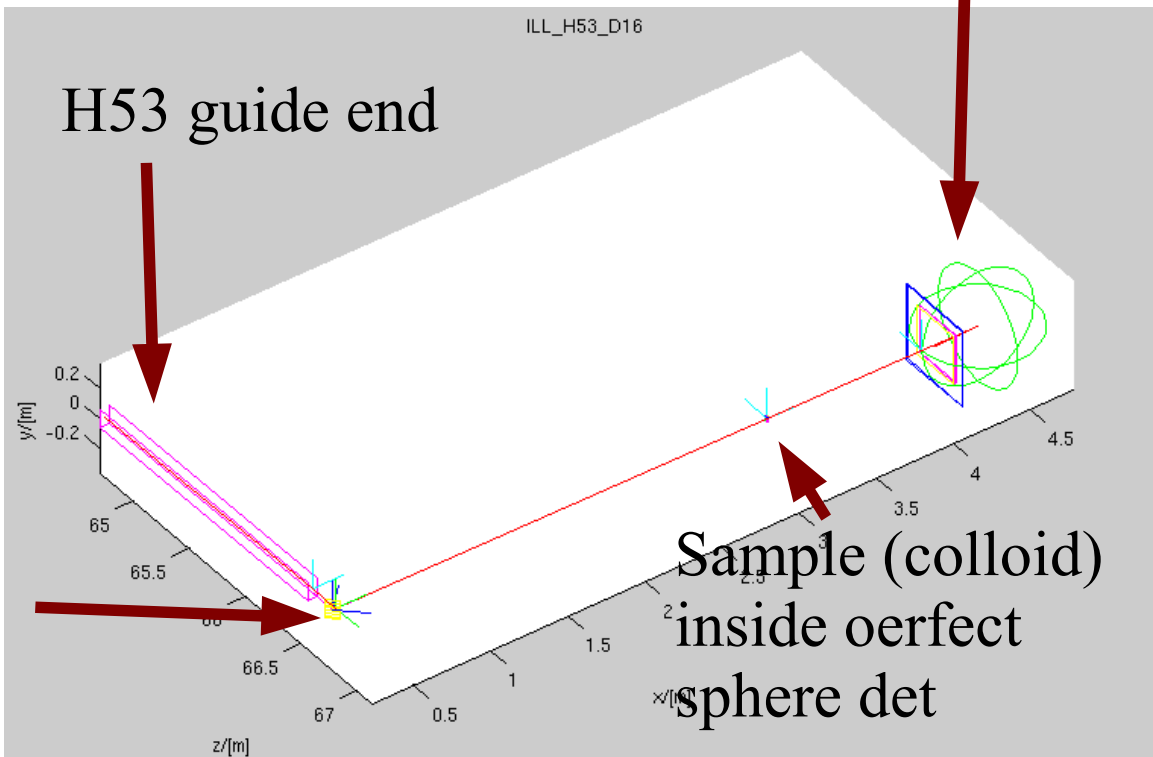
Model of D16: HCS, H53, monochromator λ=4.7 Angs, colloid sample, MILAND

MILAND contains one spherical window plus a plate (all Al).

Estimate background for D16 usual configurations: Al is transparent -> **OK**

Need further work.

MILAND 32

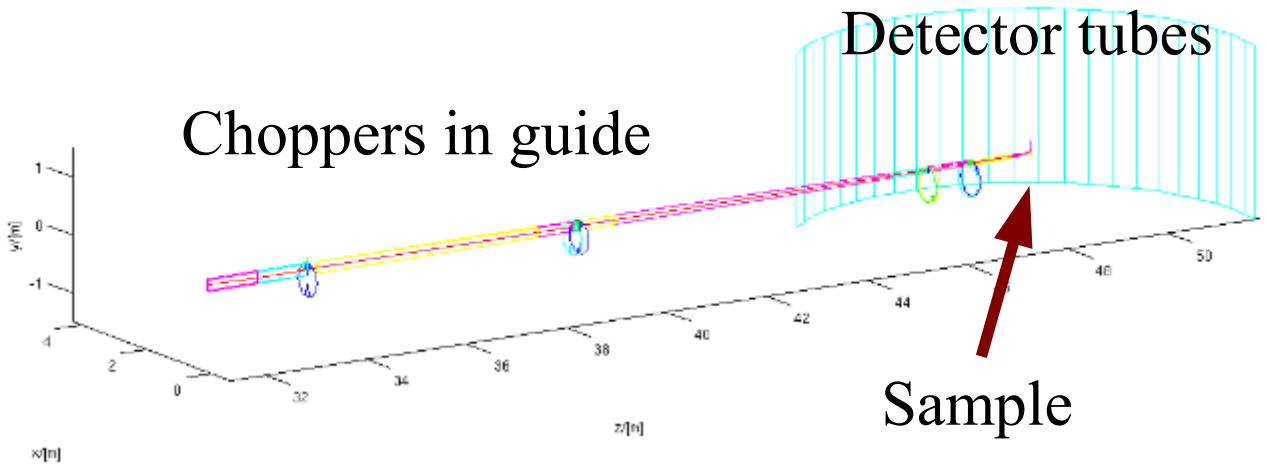


D16 Monochromator

Example 3: IN5 tube detectors

Model on IN5: VCS, H14 guide, choppers, sample and detector tubes.

Estimate neutron **penetration** in detector tubes: 6 mm for λ=4 Angs
Mean parallax + charge **drift**: 2.5 mm
Absolute intensity simulated in agreement with measurements
Background from **Iron housing**: 2.5 % for λ<2.5 Angs, and 1 % for λ<4 Angs.
Scattering on housing adds path length, which shows up as a +TOF asymmetry
Absorbent walls suppresses background: 1 % for λ<2.5 Angs, and nothing else.
Absorption on housing is 2-6 % (max at λ=4 Angs), follow Bragg edges.



Future ?

No JRA for simulation: very limited resources

Improvement in the package:

- dead time,
- further tests of gas detector model
- other types of detectors (solid scintillators)

But work can be shared by training you !
I suggest to organize a **tutorial session** autumn.2009

Invite *McStas* team at your facility to foster collaboration and training (tutorial, workshop).

Attend ICNS workshop (May 2).