WP6 – Advanced Reflector

N. Rizzi, E. B. Klinkby, A. Chambon

HighNESS General Meeting

WP6: Activities, achievements and planning

1. NCrystal plugin for modeling neutrons scattering on nanodiamonds: Development and validation

2. Support for WP7 and WP8: MCPL event files

3. Preparing for validation experiment at Budapest Neutron Center, Cold Moderator Test Facility (CMTF)

1. NCrystal plugin: modeling nanodiamonds

- Testing the plugin in the directional extraction
- Comparing the plugin with the MCNP implementation through OpenMC
- OpenMC has hooks to NCrystal

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Check for updates

Benchmarking of the NCrystal SANS Plugin for Nanodiamonds

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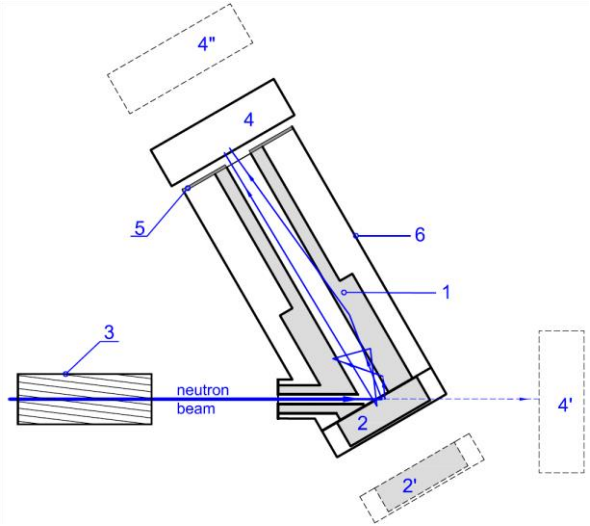
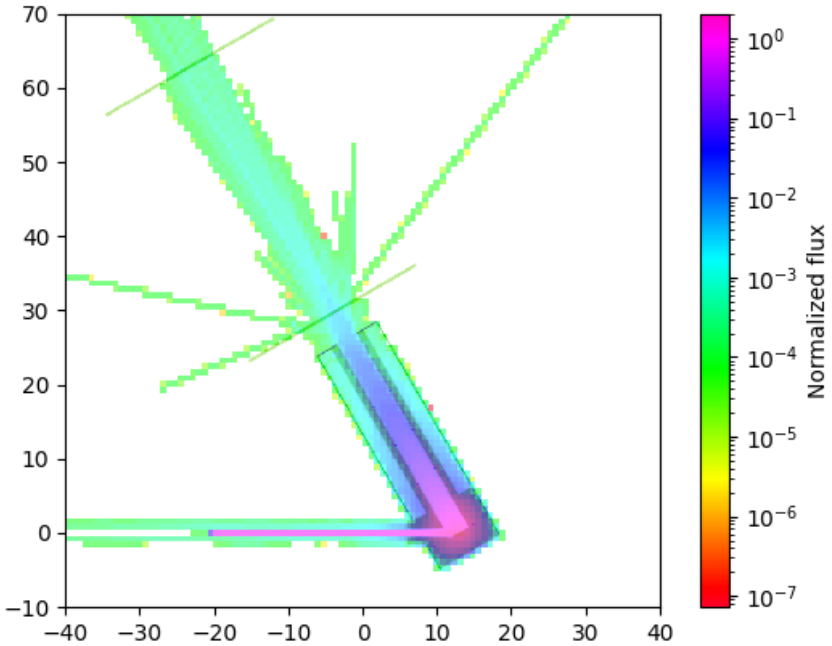
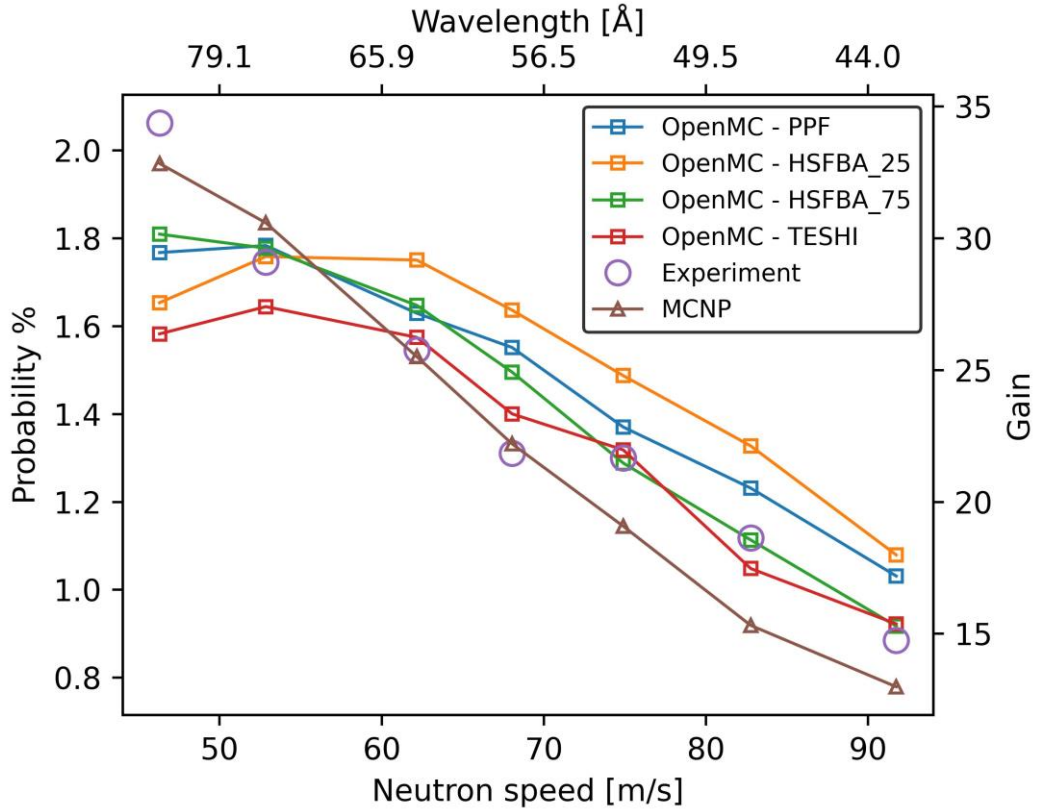
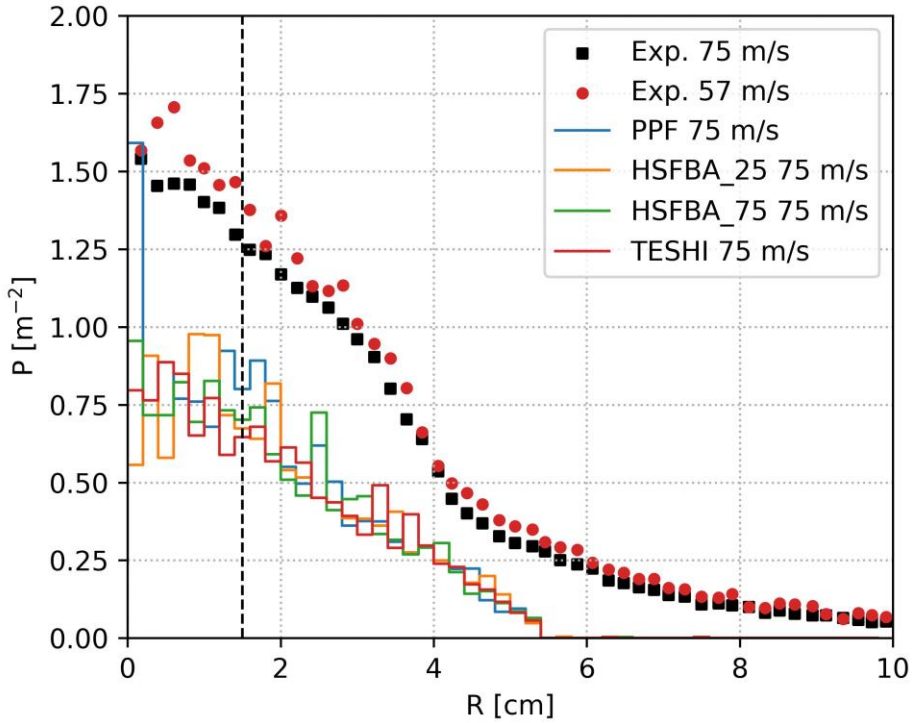


(S.M. Chernyavsky et al. https://doi.org/10.1063/5.0124833)



1. NCrystal plugin: modeling nanodiamonds





Preliminary calculations

WP6: Activities, achievements and planning

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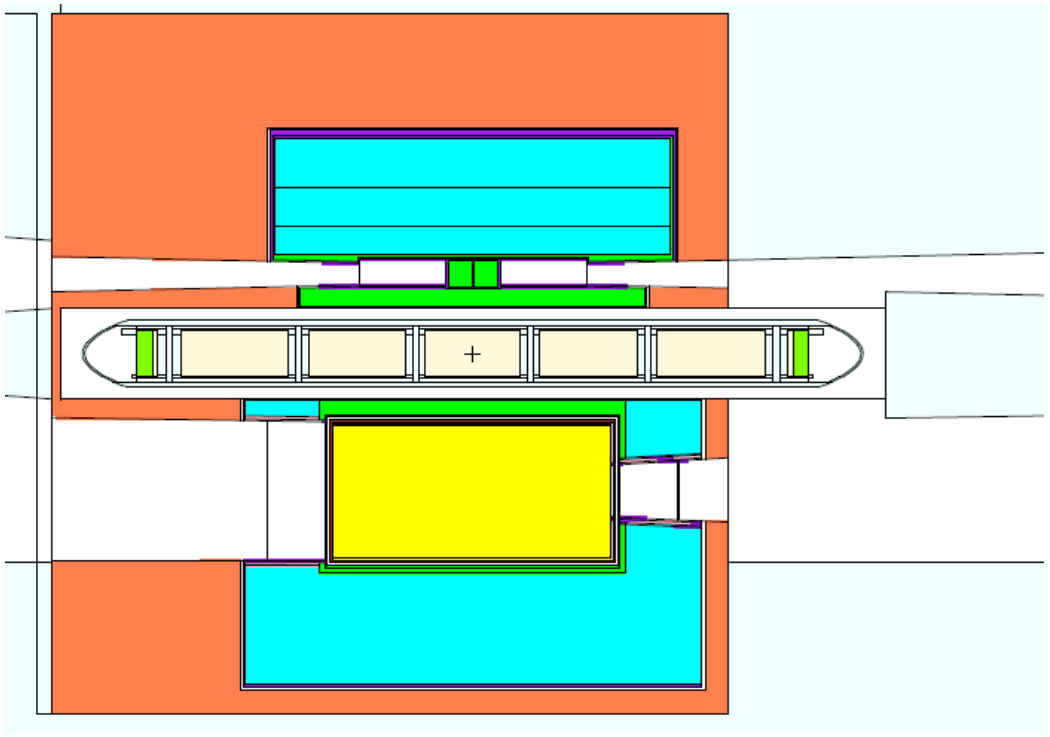
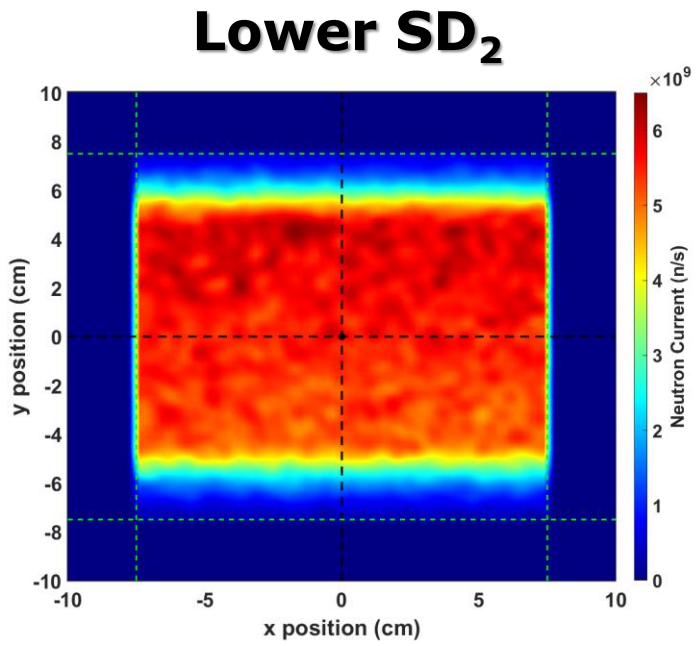
2. Production of MCPL source files

=> Exchange of MCPL files with WP7 and WP8 has been going on also for the new full SD_2 design





From Stavros Samothrakitis, WP7

WP6: Activities, achievements and planning

1. NCrystal plugin for modeling neutrons scattering on nanodiamonds: Development and validation

2. Support for WP7 and WP8: MCPL event files

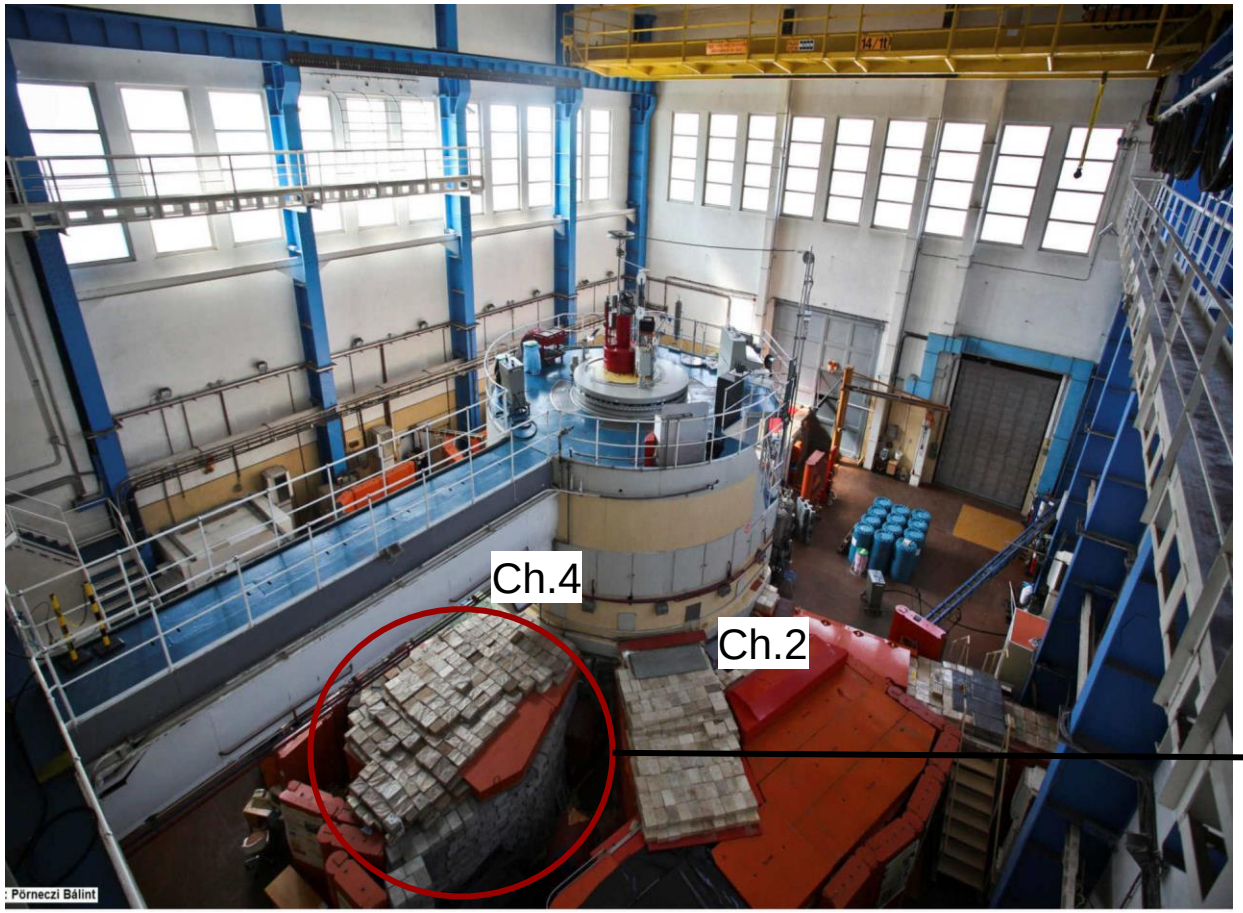
3. Preparing for validation experiment at Budapest Neutron Center, Cold Moderator Test Facility (CMTF)

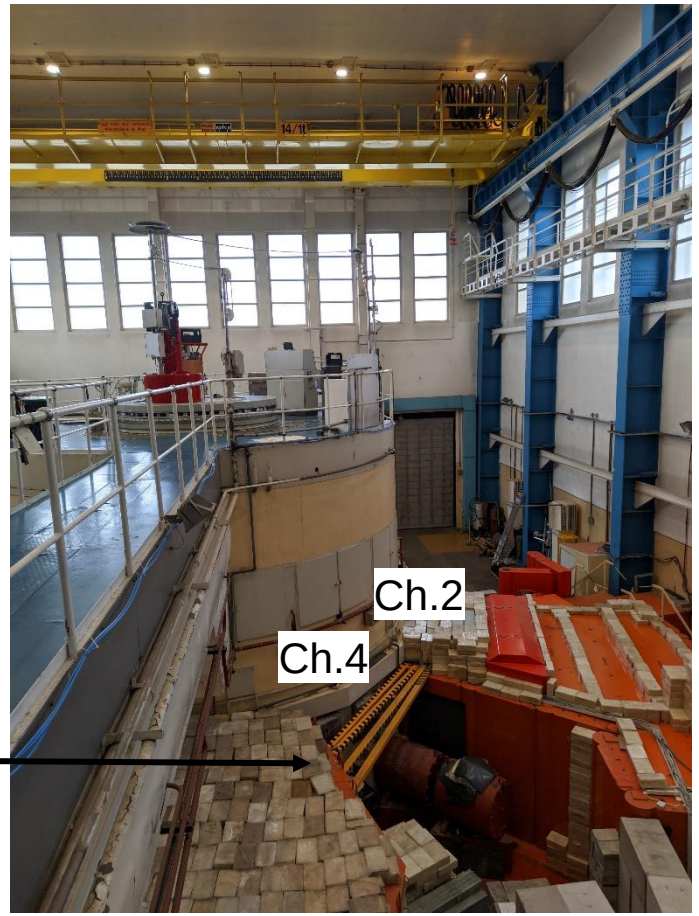
3. Preparing for validation experiment

Cold Moderator Test Facility visit - Budapest

Before

After – 09/03/2023





Panorama view of the Reactor Hall

3. Preparing for validation experiment

Cold Moderator Test Facility - Budapest

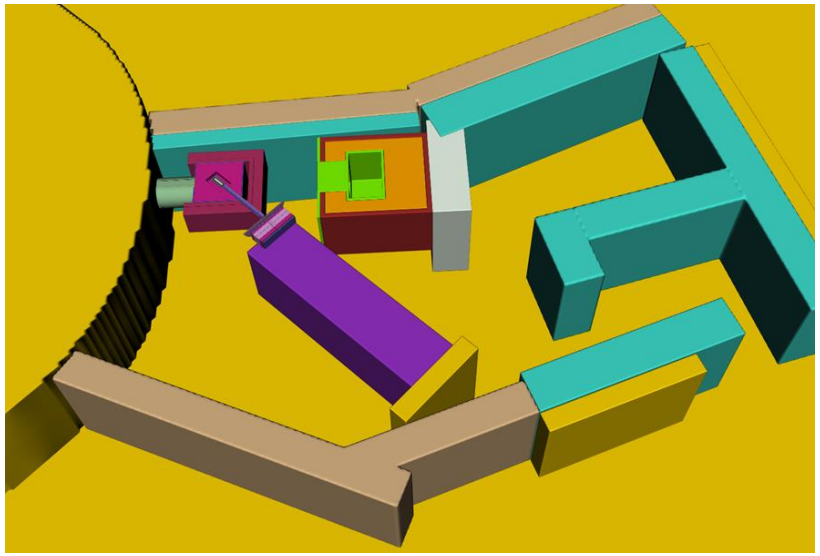
Inside Ch.4

CMTF temporary set-up for the radiation level measurements:

- *Dummy collimator*
- *Dummy reflector*
- *Beam stop*
- *Shielding: bricks of paraffin, graphite, heavy concrete, normal concrete*

Neutronics simulations as experiment support

- Background
- Activation *(Collaboration with ORNL)*

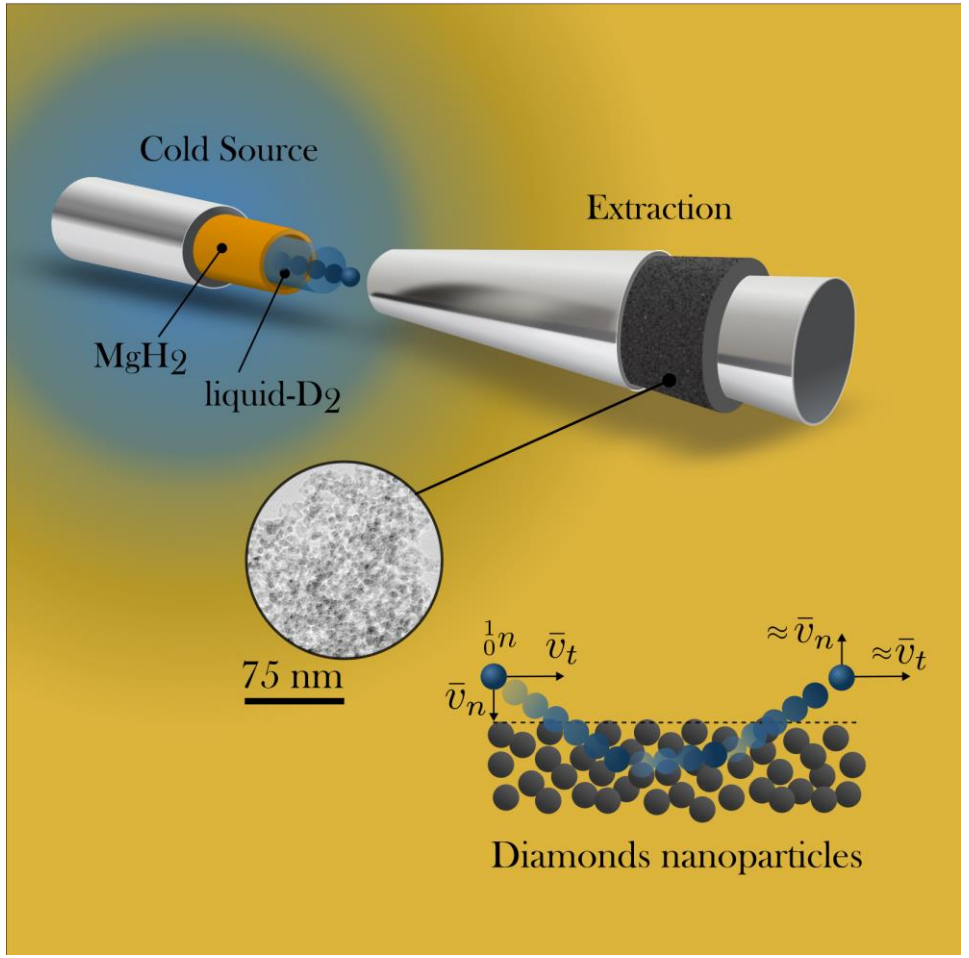


MCNP model based on CAD

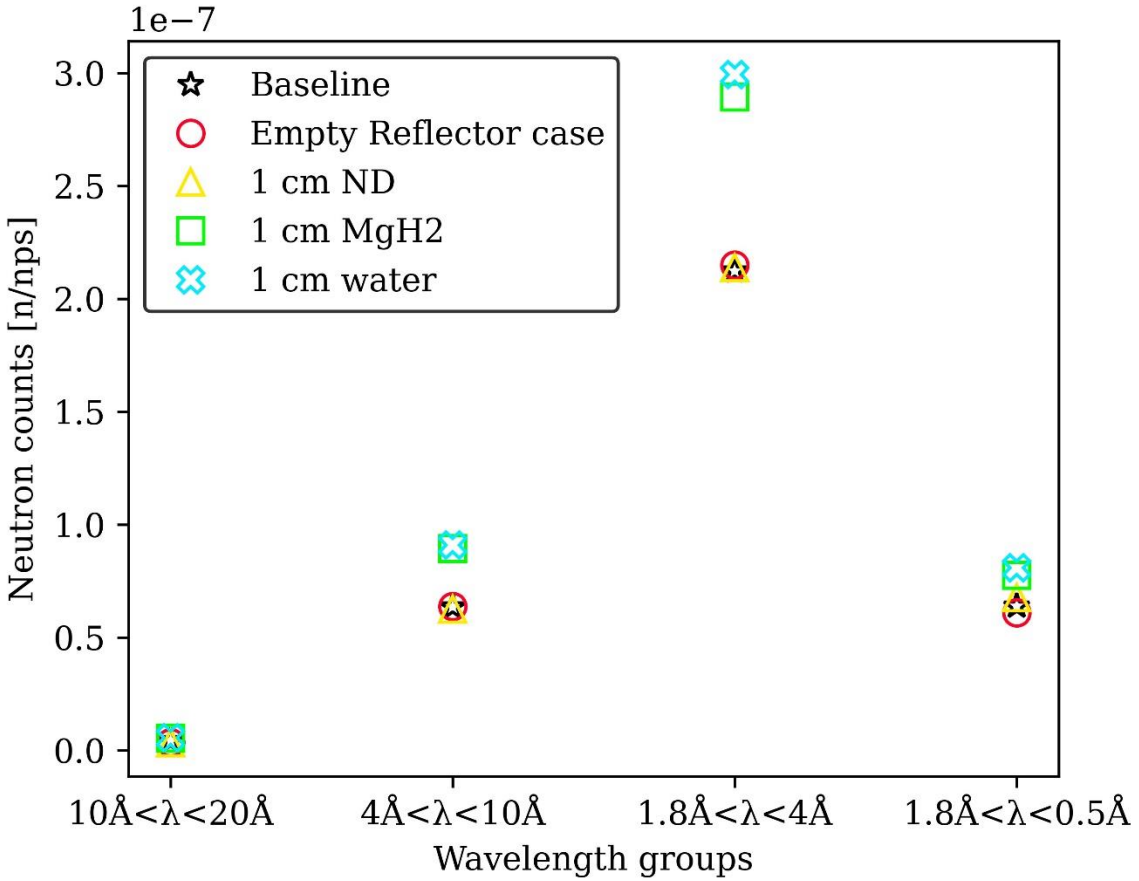
HighNESS experimental campaign

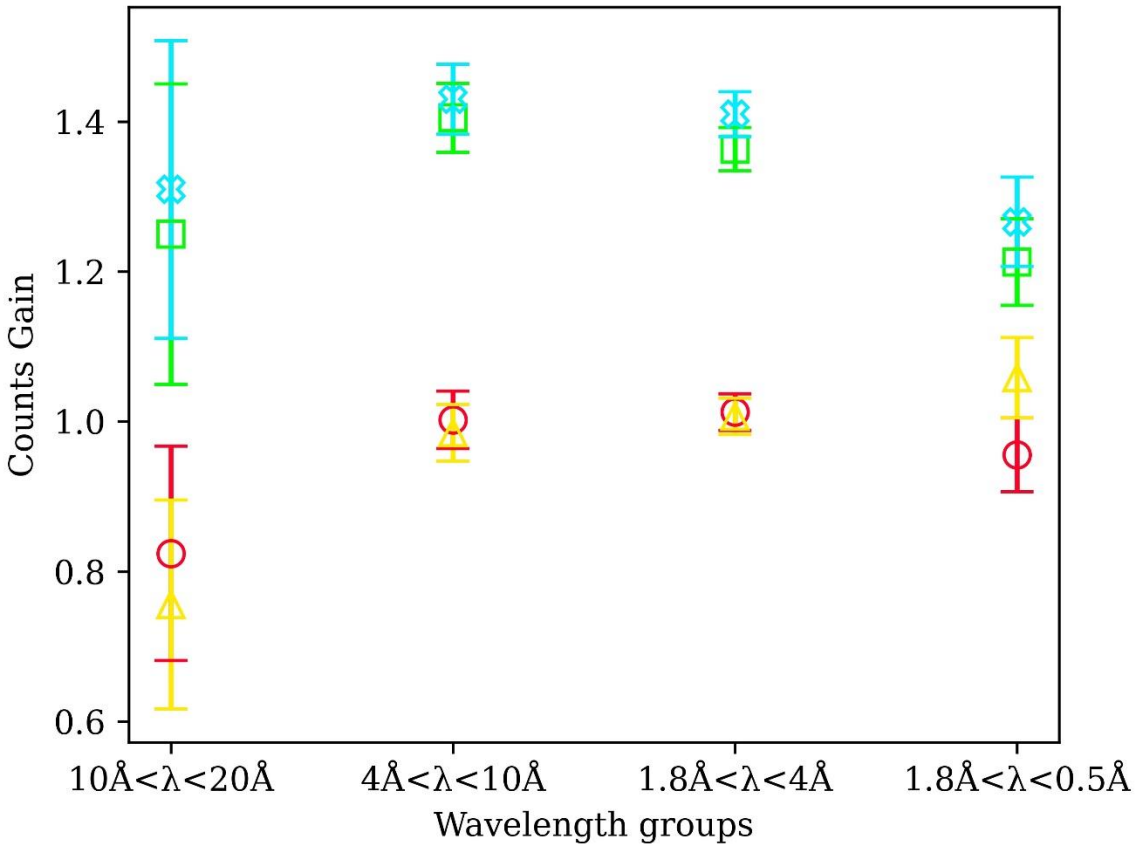
- Updated schedule: Mirrotron experiment planned in June
- *Maybe august for HighNESS*

Graphical concept

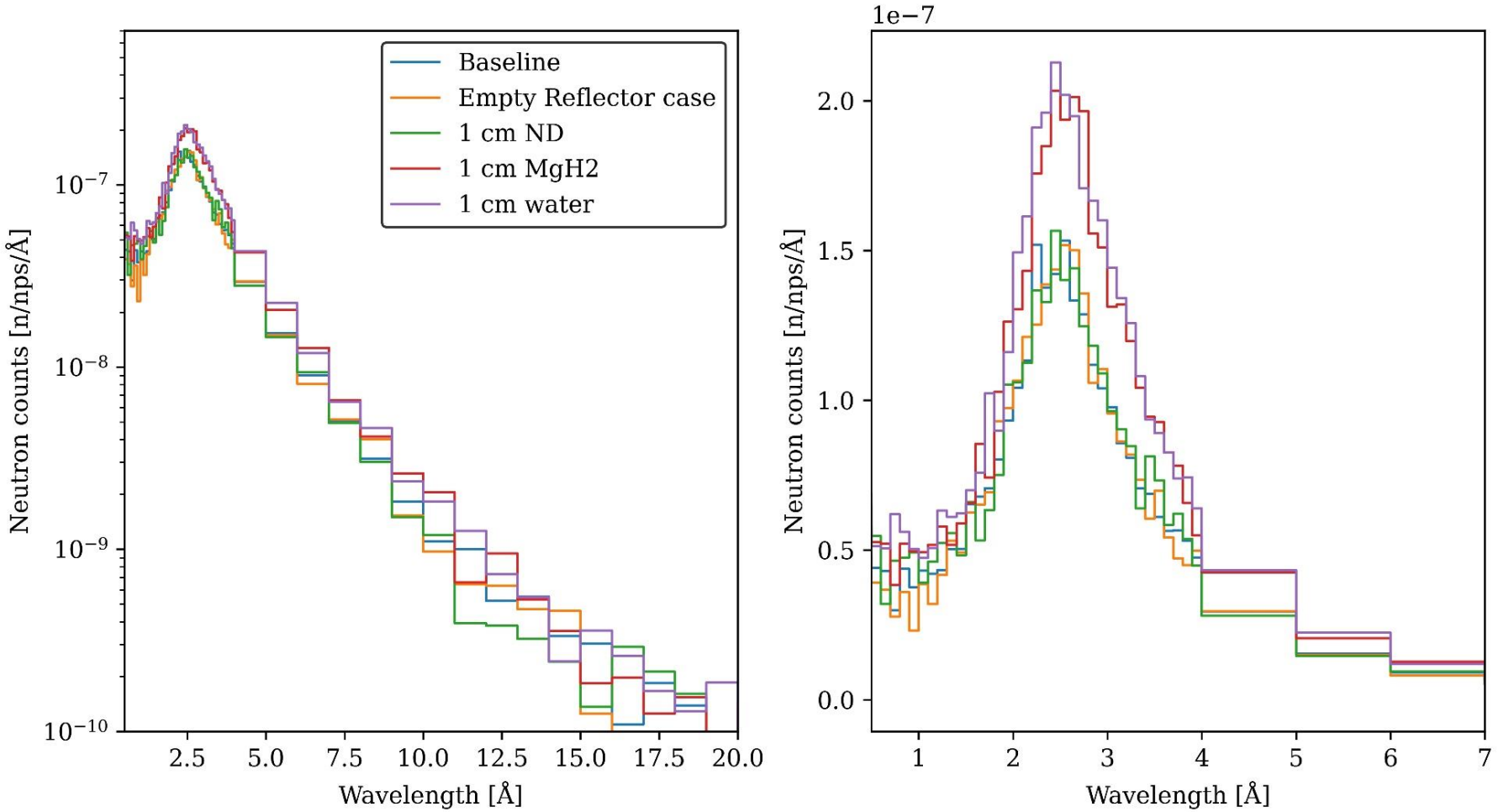


Expected results at the exit of the tube (no ND)

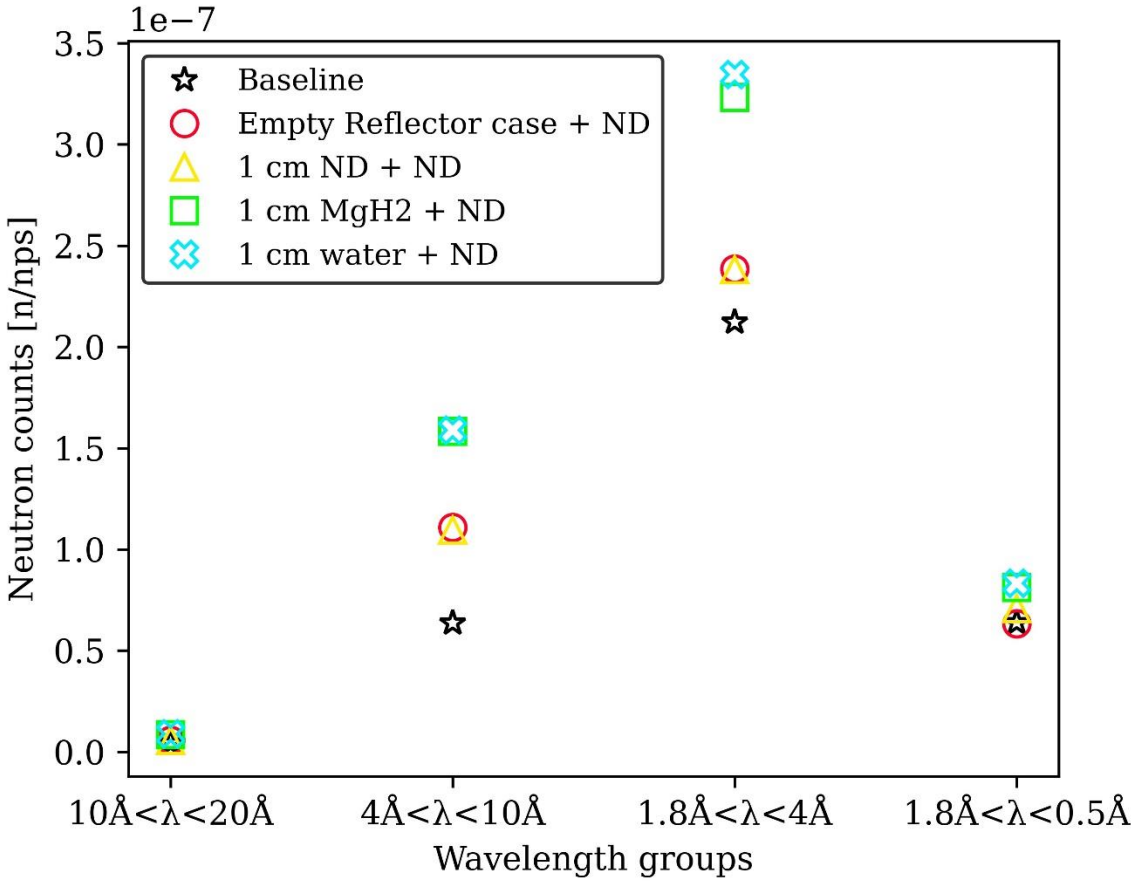


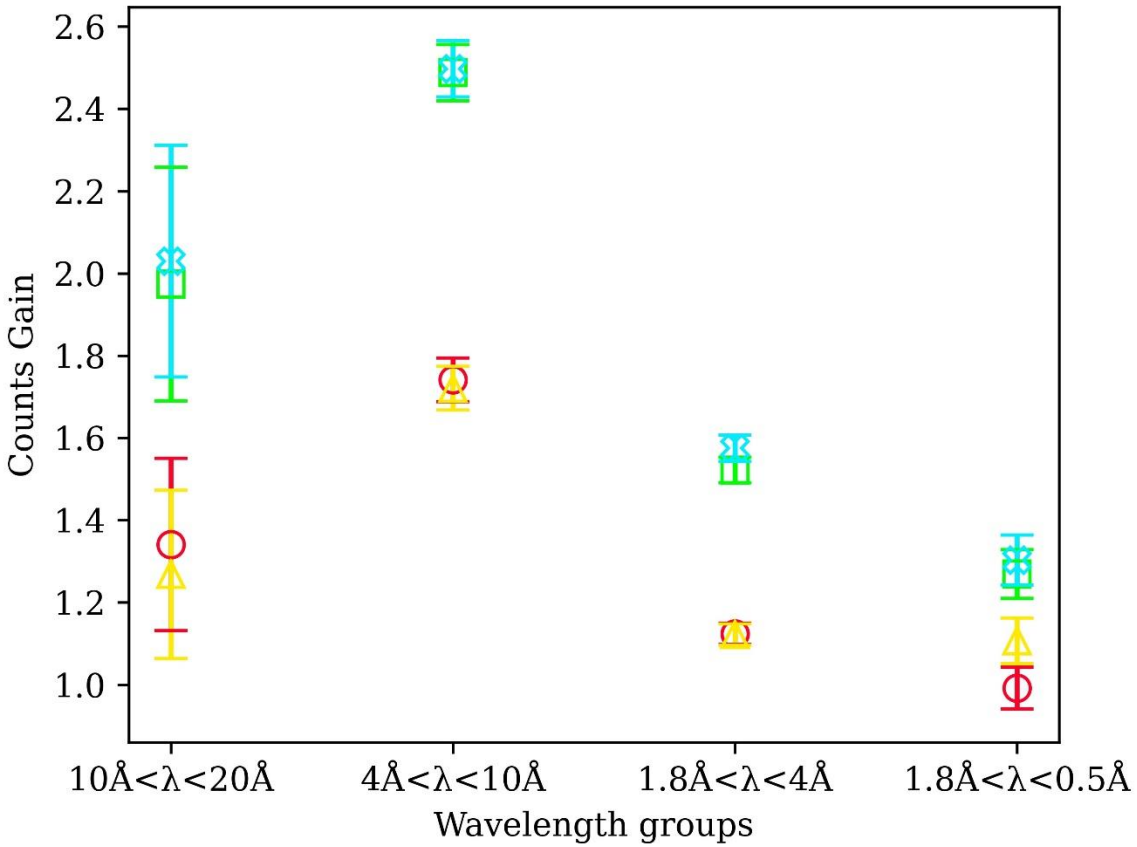


Spectra without ND in the extraction

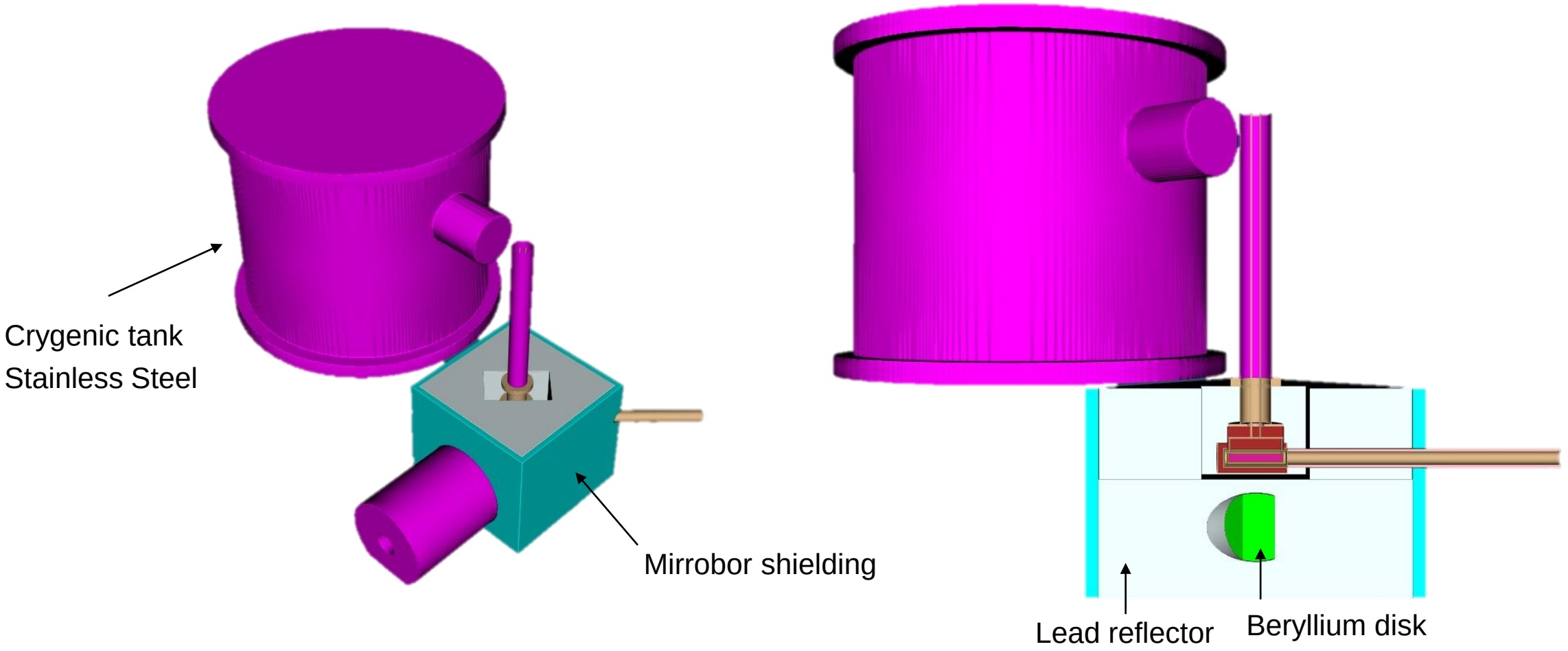


Expected results at the exit of the tube (with ND)

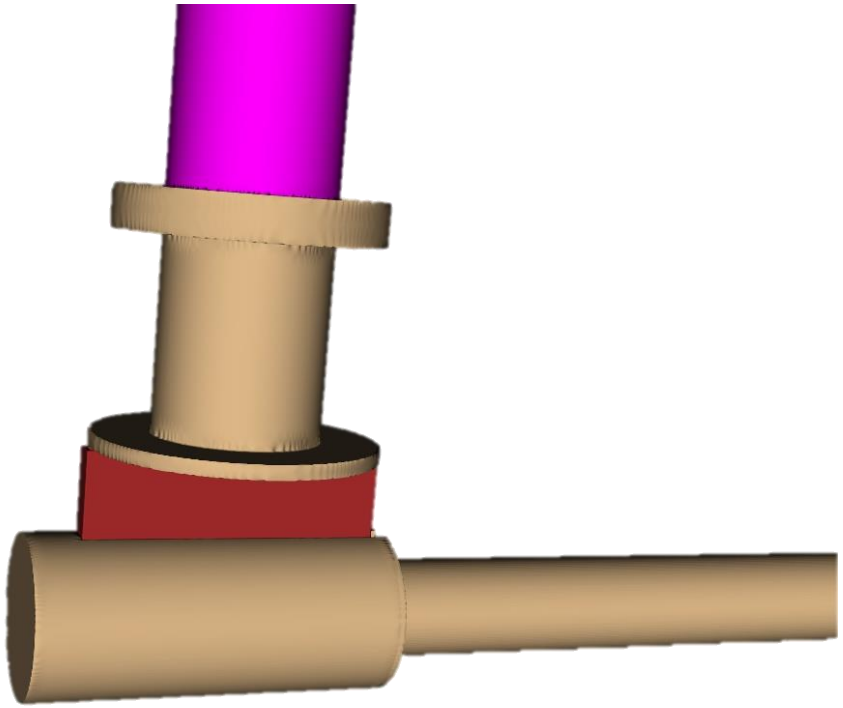


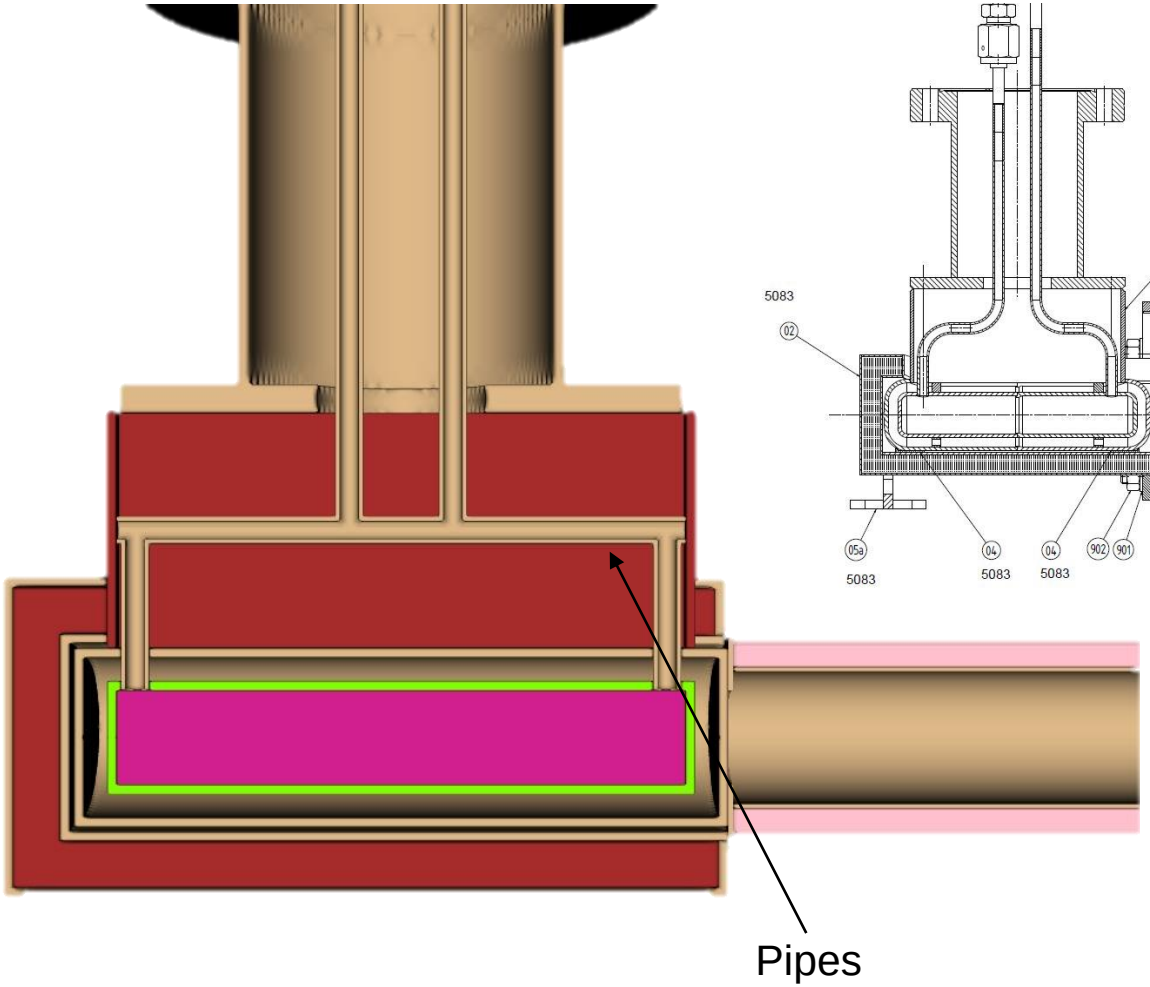


New model with cryogenics

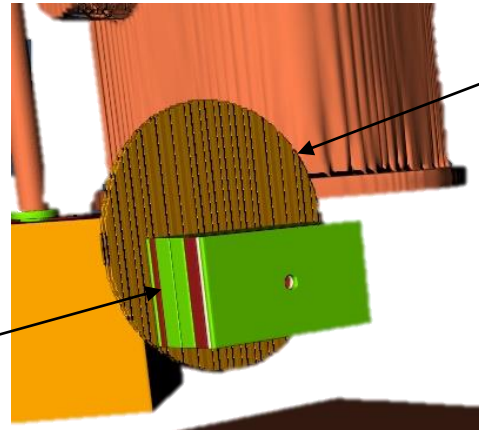


More engineering details



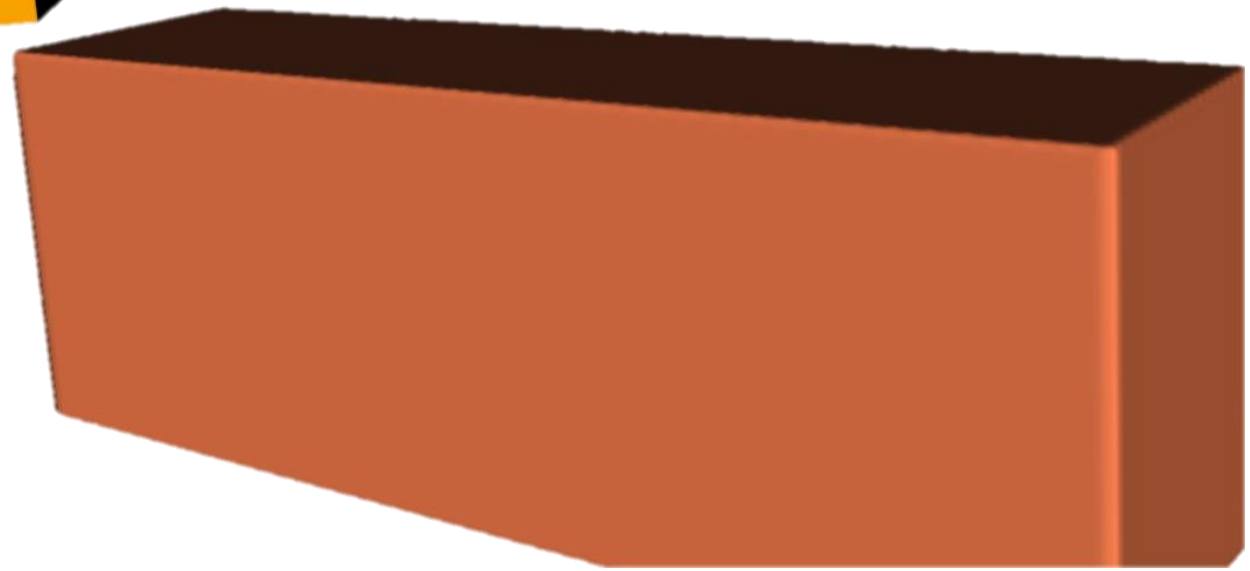


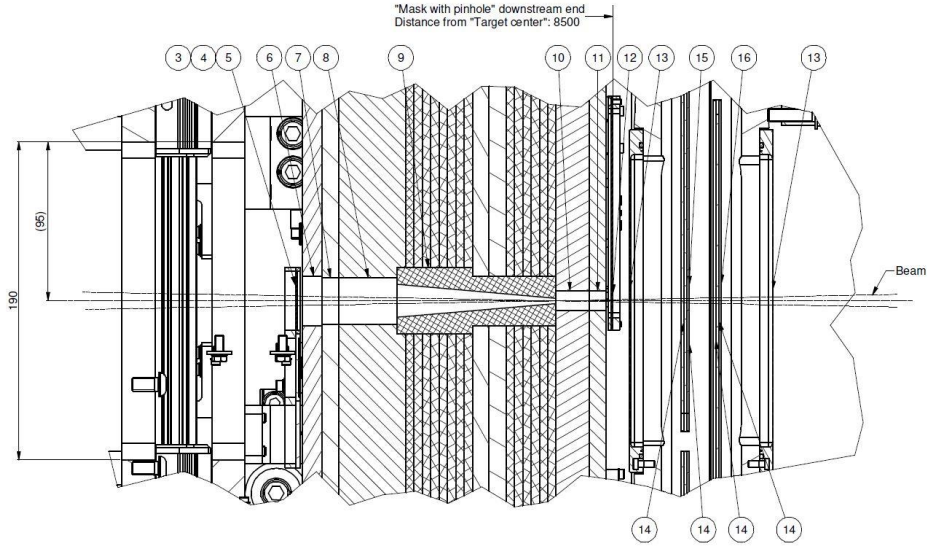
Detection system



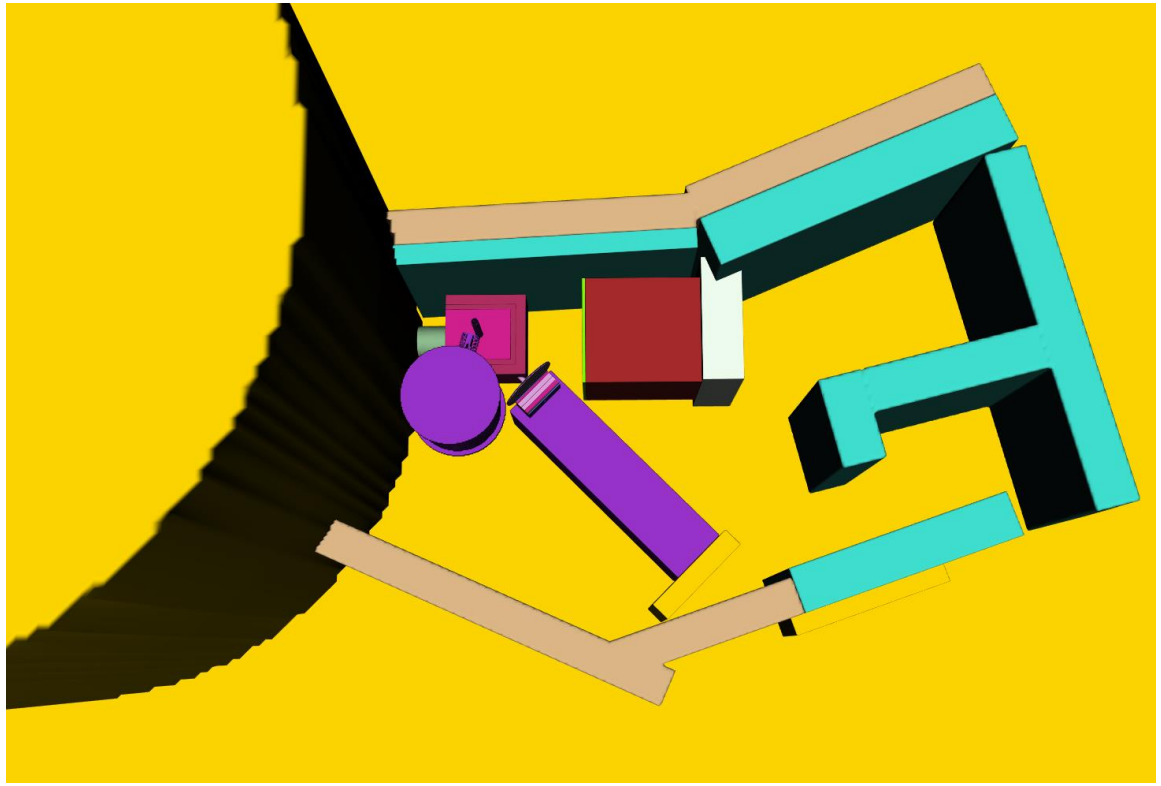
Chopper

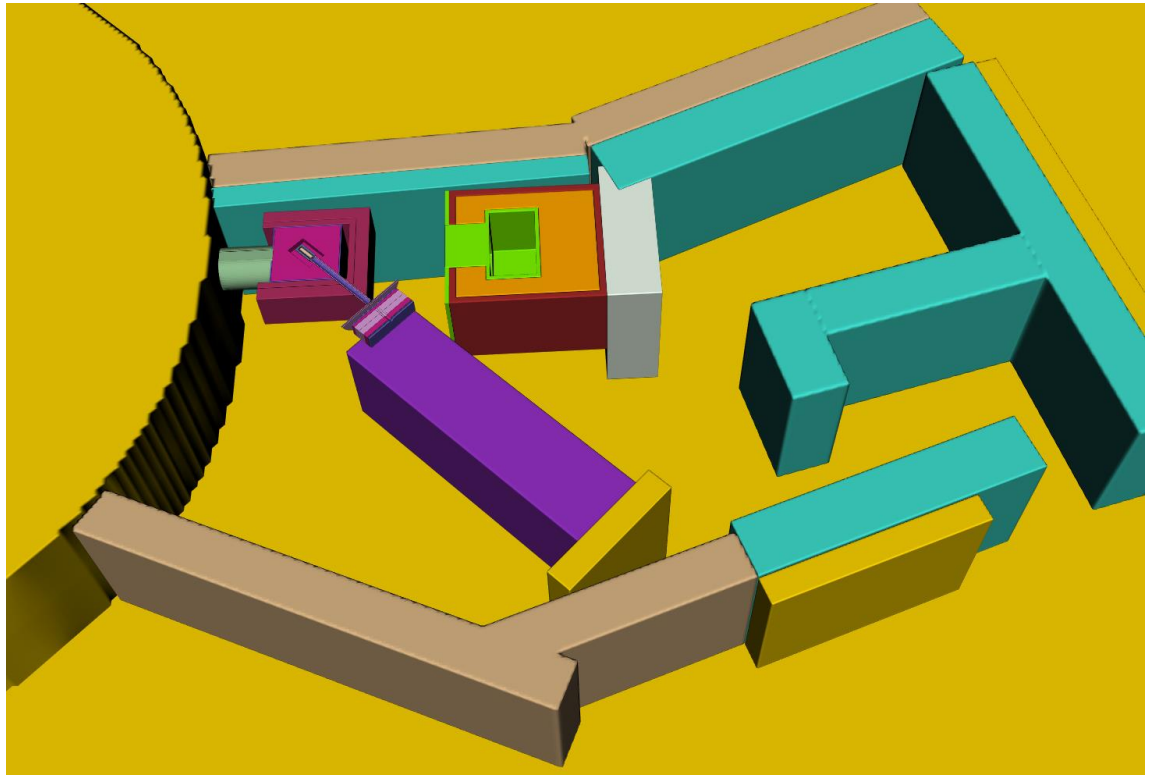
Pin hole assembly





New simple model from CAD





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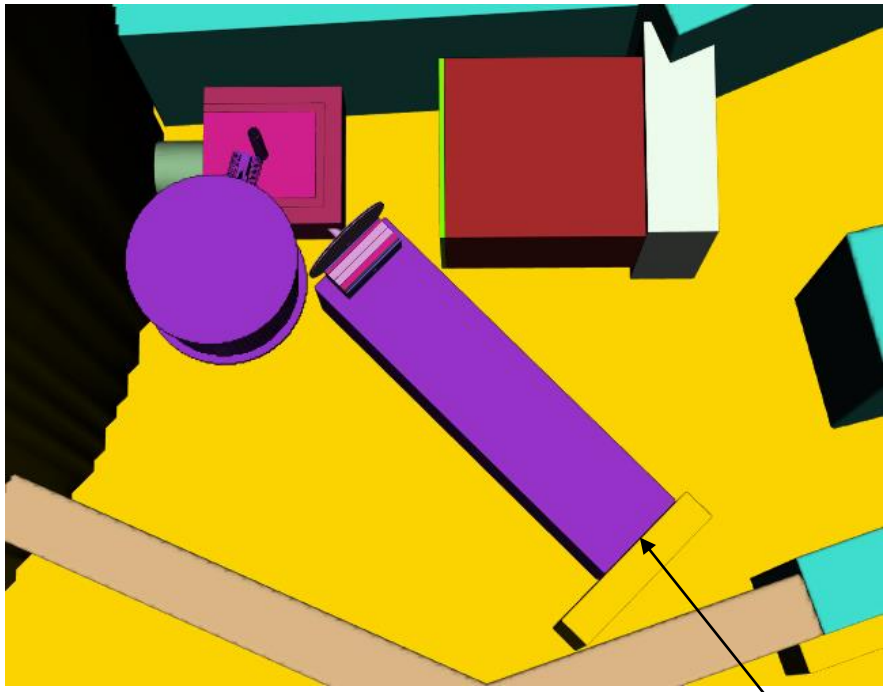
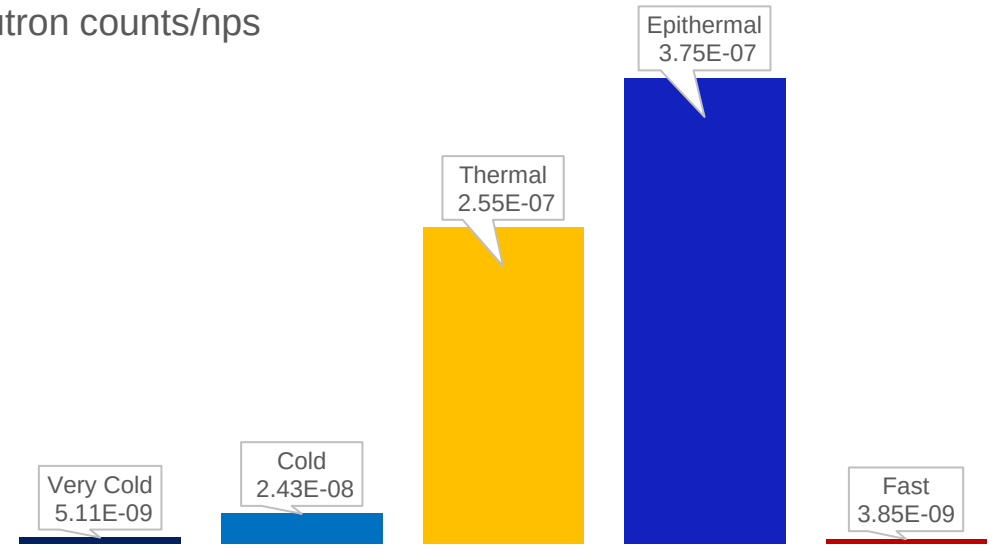
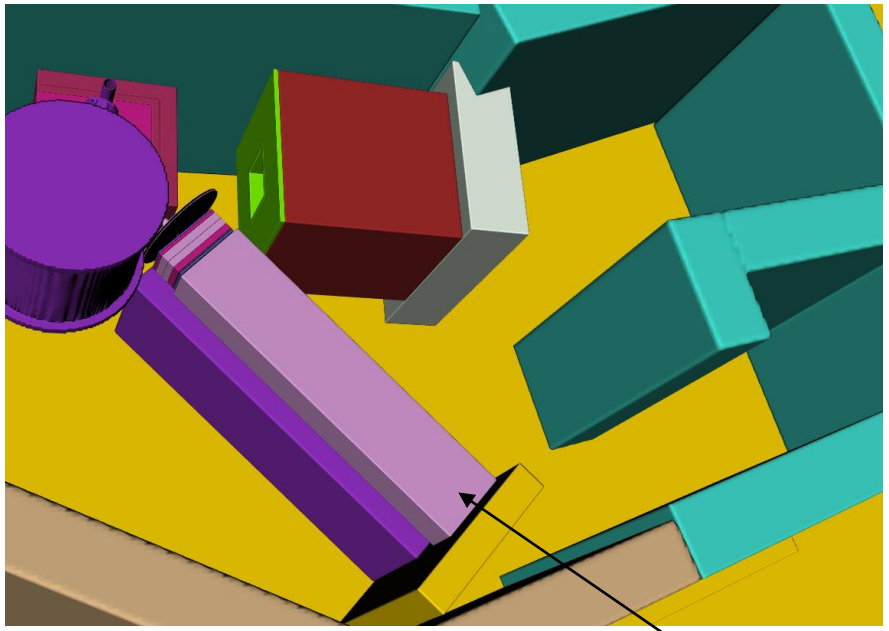


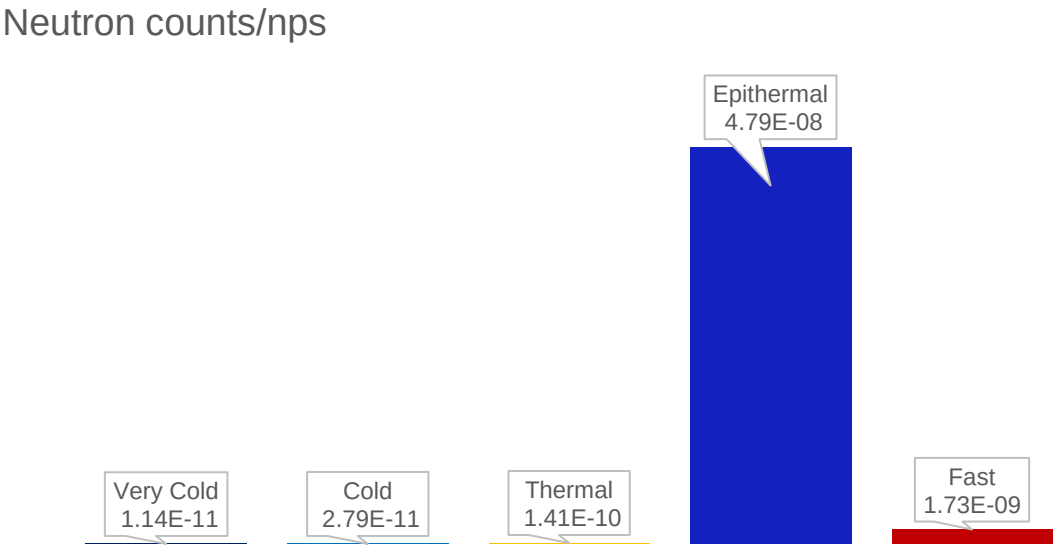
F5 tally at detector position, no ND!



Added mirrobor shielding



Mirrobor shielding effective for thermal neutrons



Epithermal neutrons (81.8 meV - 1 MeV)