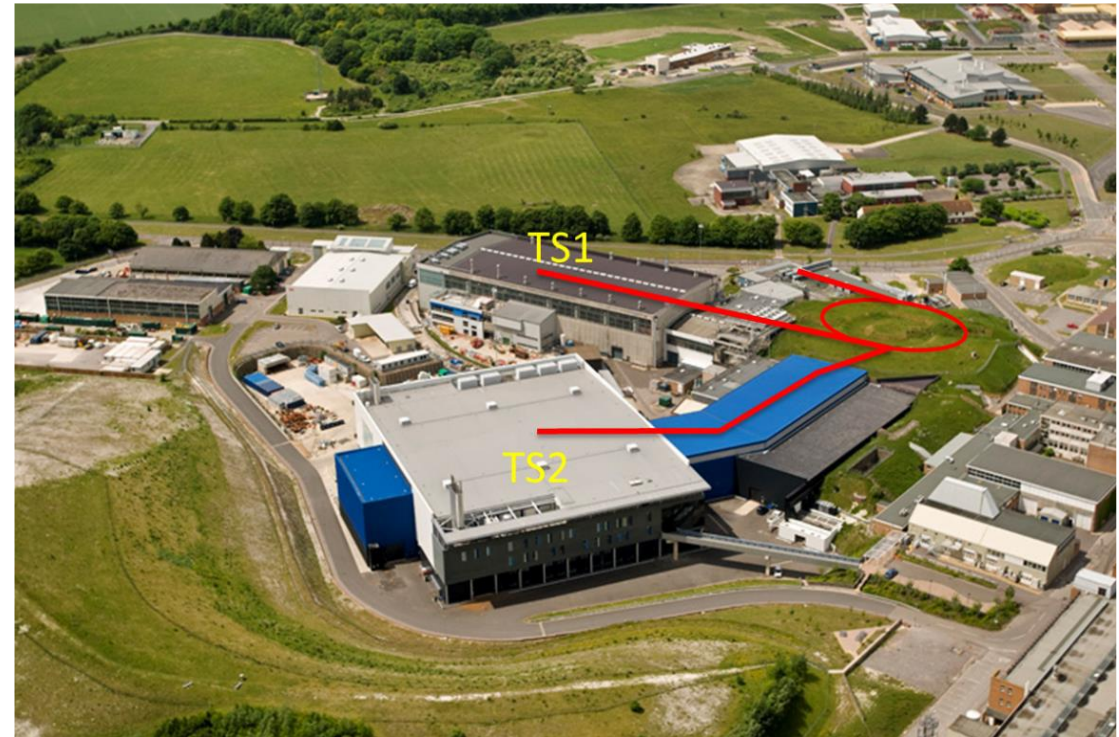


ISIS Moderator update

S Lilley on behalf of ISIS

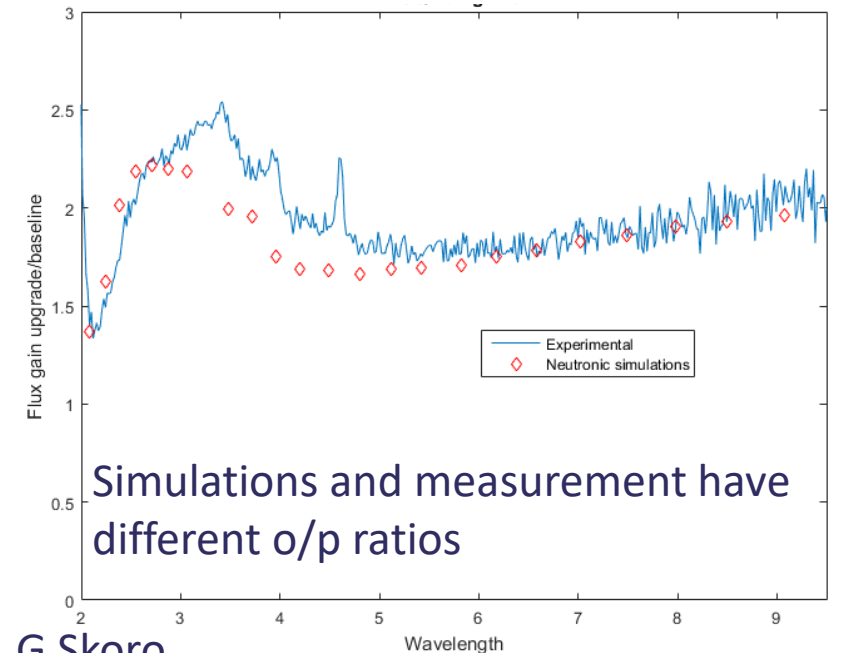
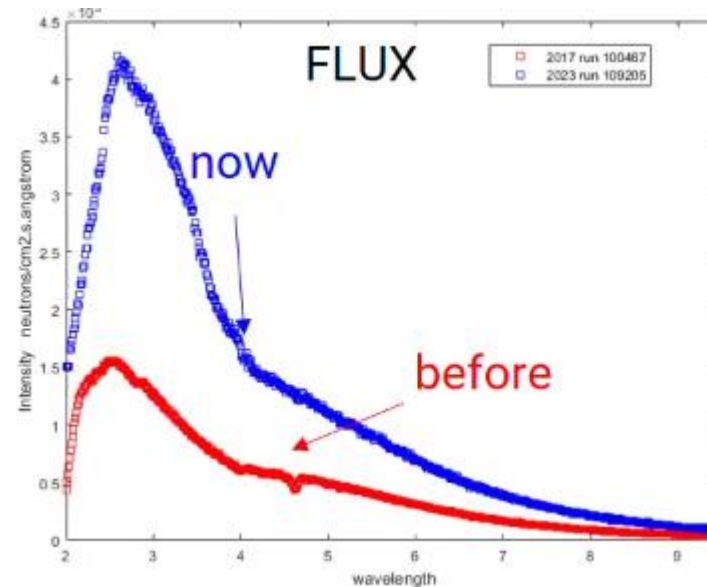
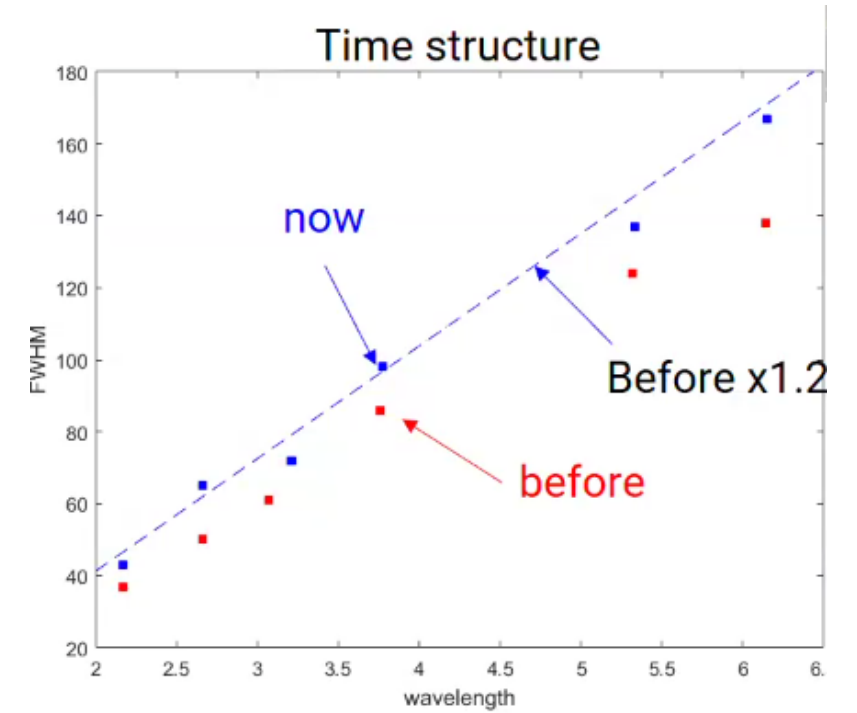
Overview

- ISIS is 40 years old in 2024
- 800 MeV spallation facility
- TS1 project long shutdown 21-22
 - Focus on extending the life of the target station
 - But limited performance gains due to resolution constraints
- Replaced all TS1 moderators, new designs for both cold moderators
- January 24 shutdown – all cold moderators replaced on both target stations



Target station 1- hydrogen

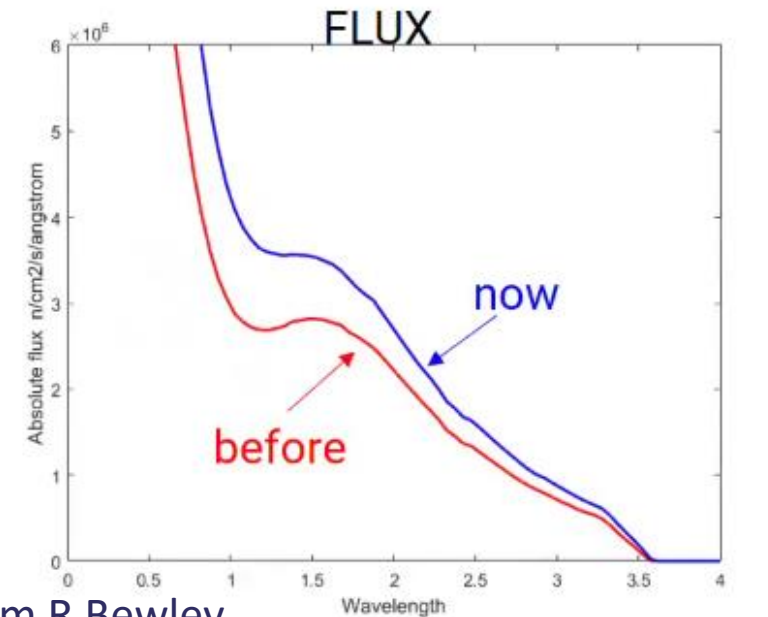
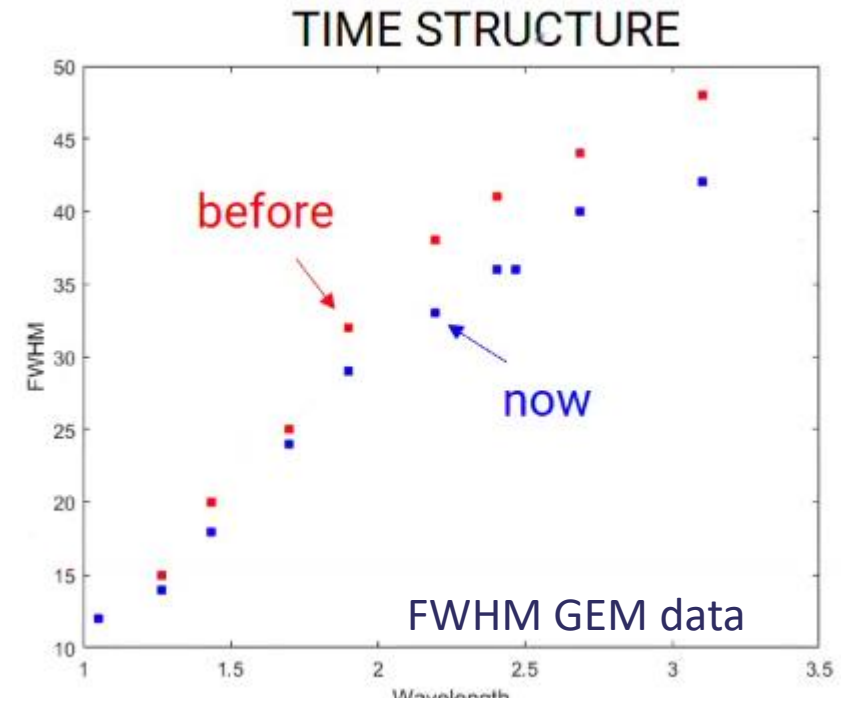
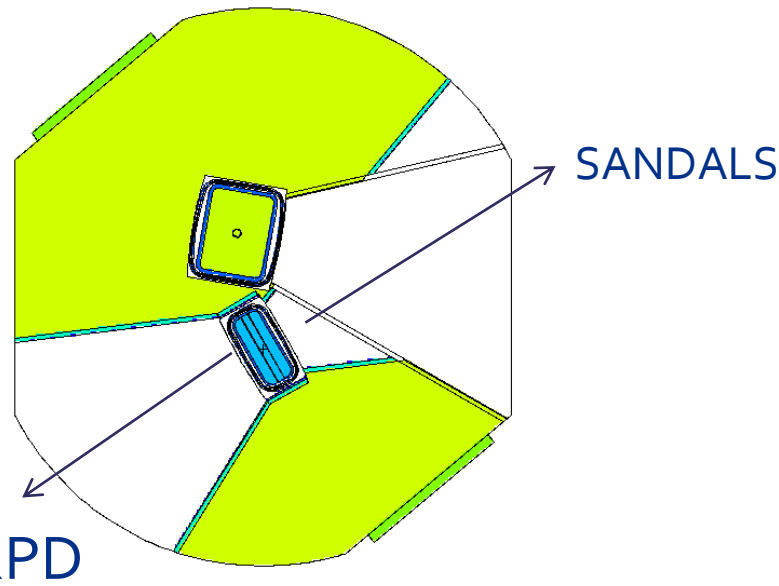
- Hydrogen – coupled moderator
- New design implemented
- Performance was good
- Factor approx. 2 in flux gain and FWHM 1.2 wider
- But several leaks developed
- New moderator installed in Jan 24
 - – with new bellows design



Data from R Bewley, G Skoro

Target station 1 - methane

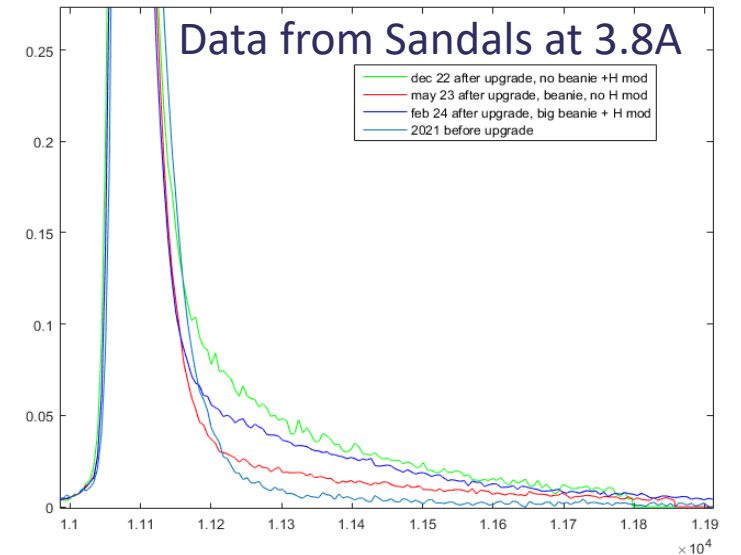
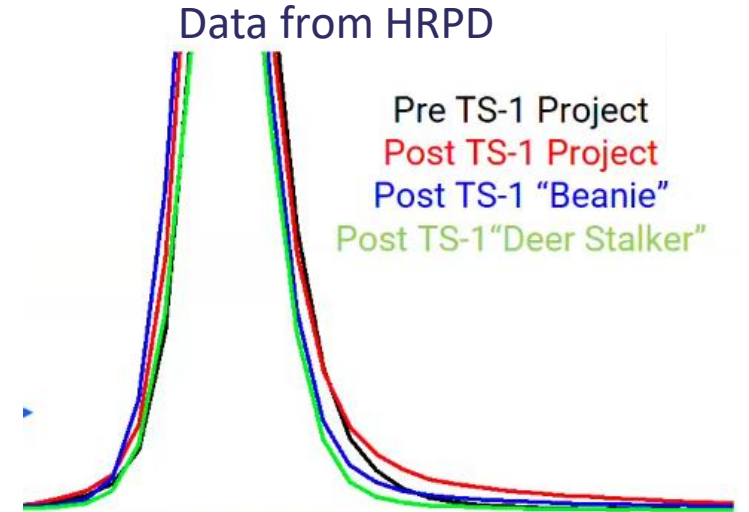
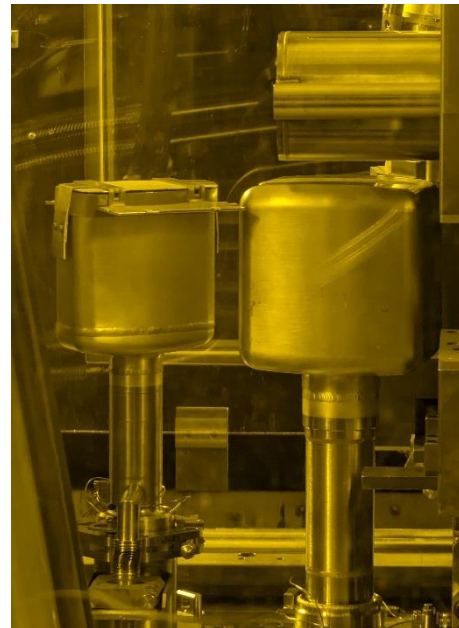
- New dual poison foil decoupled moderator installed
- Predicted 5 % narrower FWHM
- Achieved 10% narrower FWHM
- Flux gain by around 20 %



Data from R Bewley

Target station 1 - methane

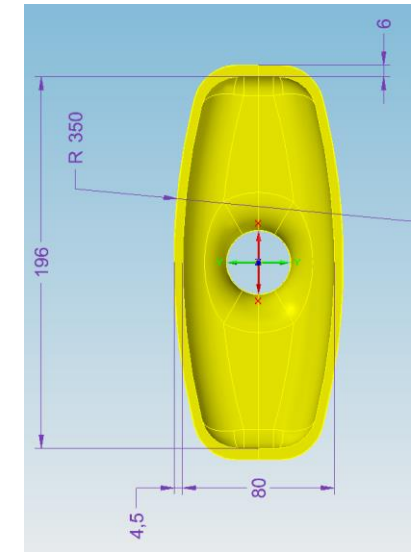
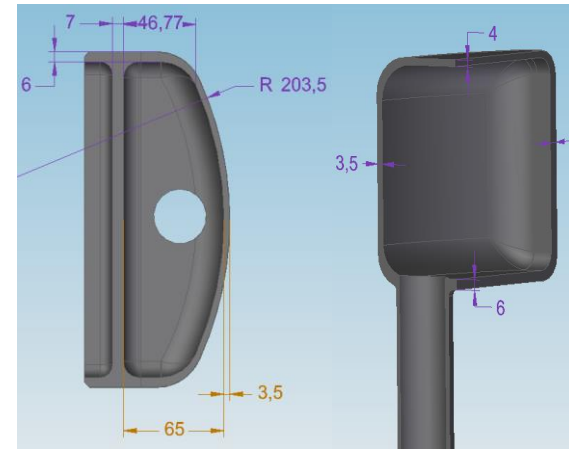
- But a tail was found in the pulse shape!
- A quick fix Cd 'beanie' cap was added to improve the decoupling
- An improved design was added in Jan 24 the Cd 'deer stalker'
- Tails have now been suppressed for the instruments that were most affected
- Still some tail on the other side of the moderator likely due to cross talk from the hydrogen moderator



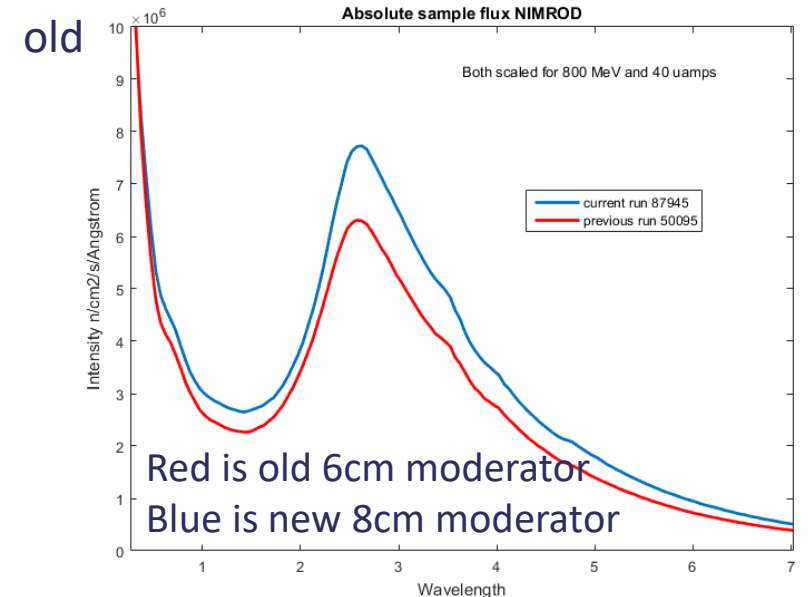
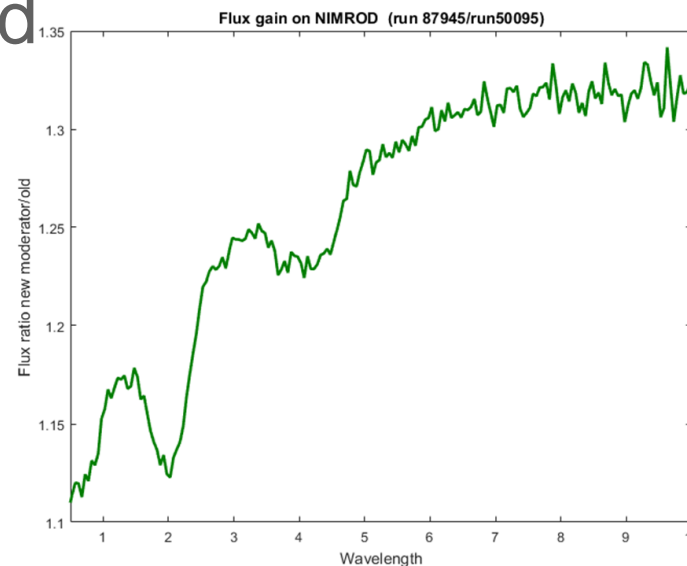
Data from R Bewley

Target station 2 - hydrogen

- Hydrogen moderator, new optimised design,
- Installed Jan 24
- Performance looks very good
- No noticeable change in resolution
- Flux increase as predicted



new

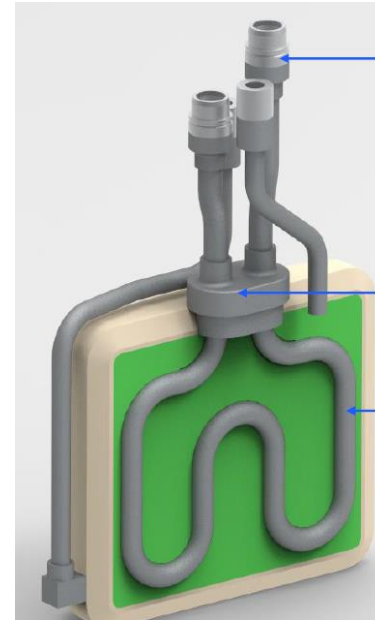


Data from R Bewley

Target station 2 – solid methane

- Plan to change design in Jan 25
- Updated heat exchanger design

- In 2023 had a mysterious performance improvement
- Ran colder and more stable
 - Likely a material change although manufacturer says no change
 - Possibly an operations change
 - Currently investigating



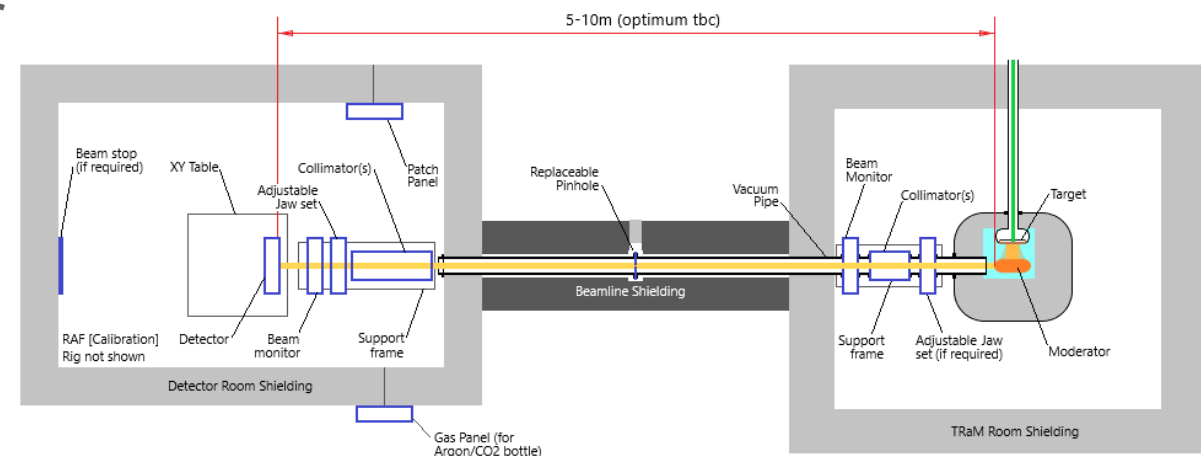
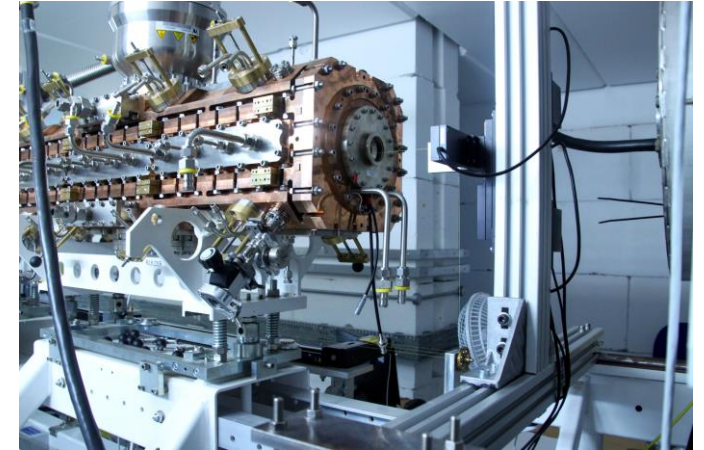
Current



New

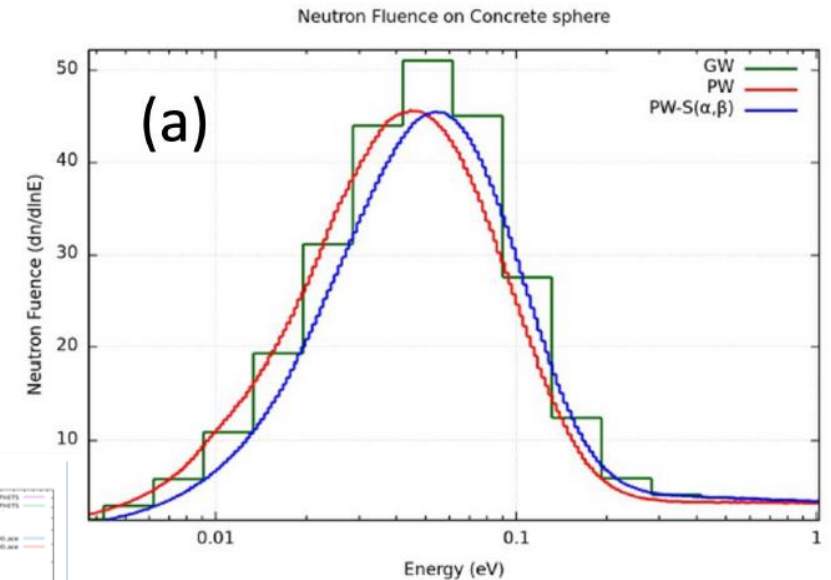
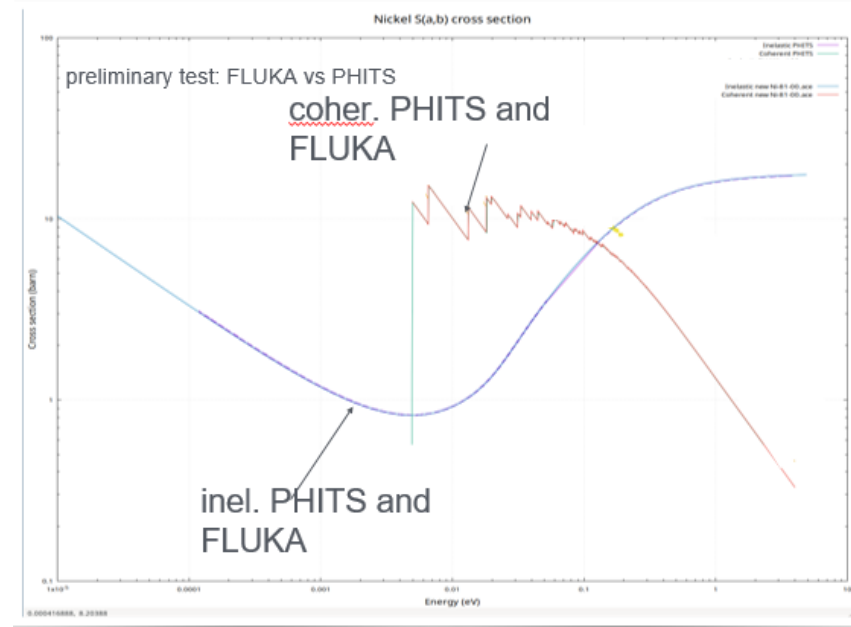
Moderator test facility - concept

- FETSMETS – FETS is existing 3 MeV 6mA proton accelerator
- Plan to add a Li target, simplified reflector and diagnostic beam line
- Aim to test moderators both engineering systems and neutronics
- supporting ISIS and ISIS-II moderator developments
- Current time line subject to funding – operational in 2028



Other moderator work - Fluka support

- Supporting Fluka Cern team with implementing improved low energy neutron treatments
- Now supports ACE files
- Point wise treatment
- Point wise $S(\alpha,\beta)$
- Including the work from Highness



Courtesy of Vasilis Vlachoudis

Summary

- TS1 project now complete –target and moderators now working well. Still some minor issues with cryo-systems and target 1st plate temperature.
- TS2 new hydrogen moderator working very well.
- TS2 Solid Methane new design on track for Jan 25
- Now looking for next moderator developments 25-30 and for longer term setting up ISIS-II needs.