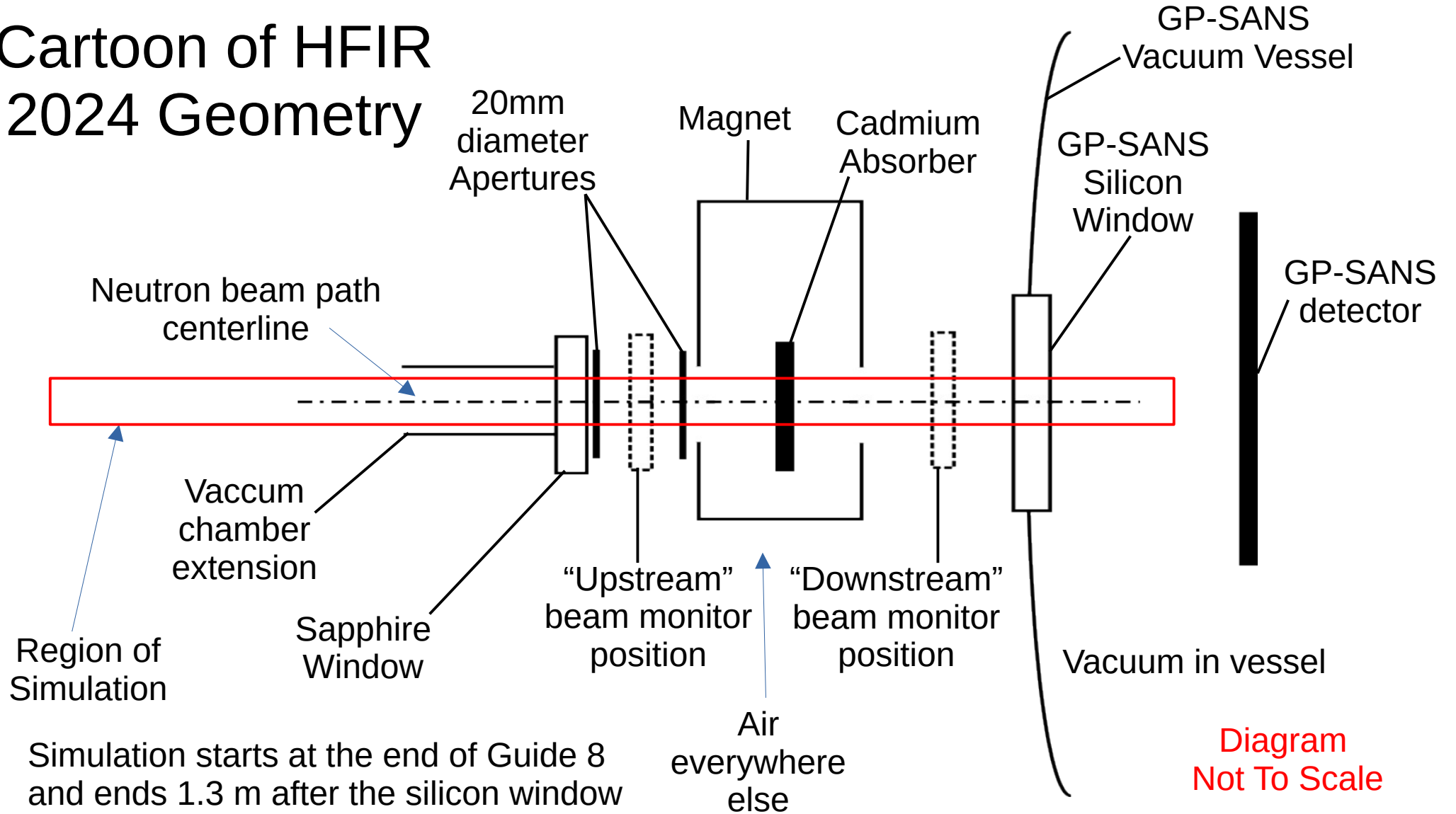


HFIR 2024 Simulation Configuration

UT-ORNL Group Meeting
August 11th, 2025
Cary Rock

Cartoon of HFIR 2024 Geometry



Simulation starts at the end of Guide 8 and ends 1.3 m after the silicon window

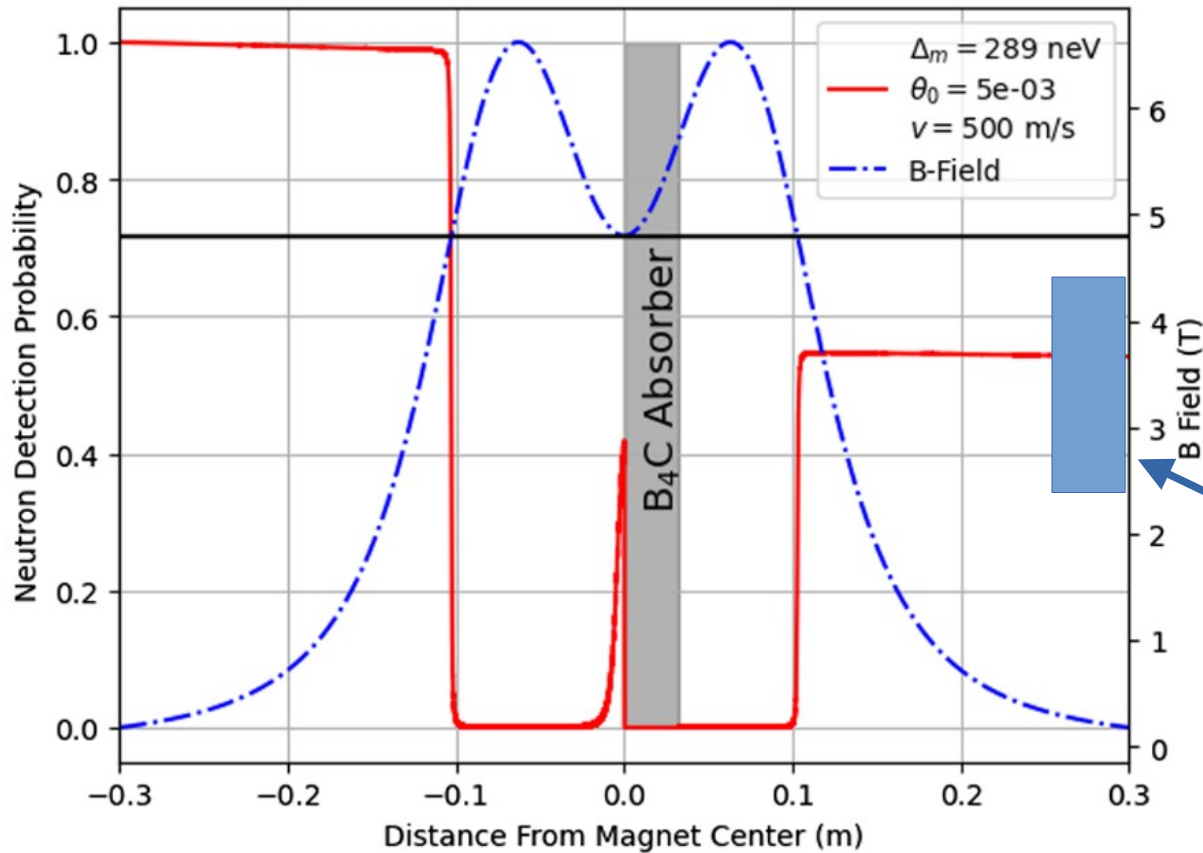
Diagram Not To Scale

HFIR 2024 Simulation Geometry AS-RUN

z = 0 @ upstream face of Cadmium; All run with W_Sct = 0

Material	Positions (mm) From → To	V (neV)	W = W_abs (neV)	Notes
Vacuum	Start: z = -1592 z < -271.35	0	0	
Sapphire	z >= -271.35 z < -265	148.0183	7.8734	
Air	z >= -265 z < -1.75	0.113364	5.7732e-6	
Cadmium	z >= -1.75 z < 1.75	58.77	8.4558	
Air	z >= 1.75 z < 287	0.113364	5.7732e-6	
Silicon	z >= 287 z < 297	53.6765	6.1834e-4	Silicon 1cm thick
Vacuum	z >= 297 Stop: z = 1614	0	0	

Magnetic Field

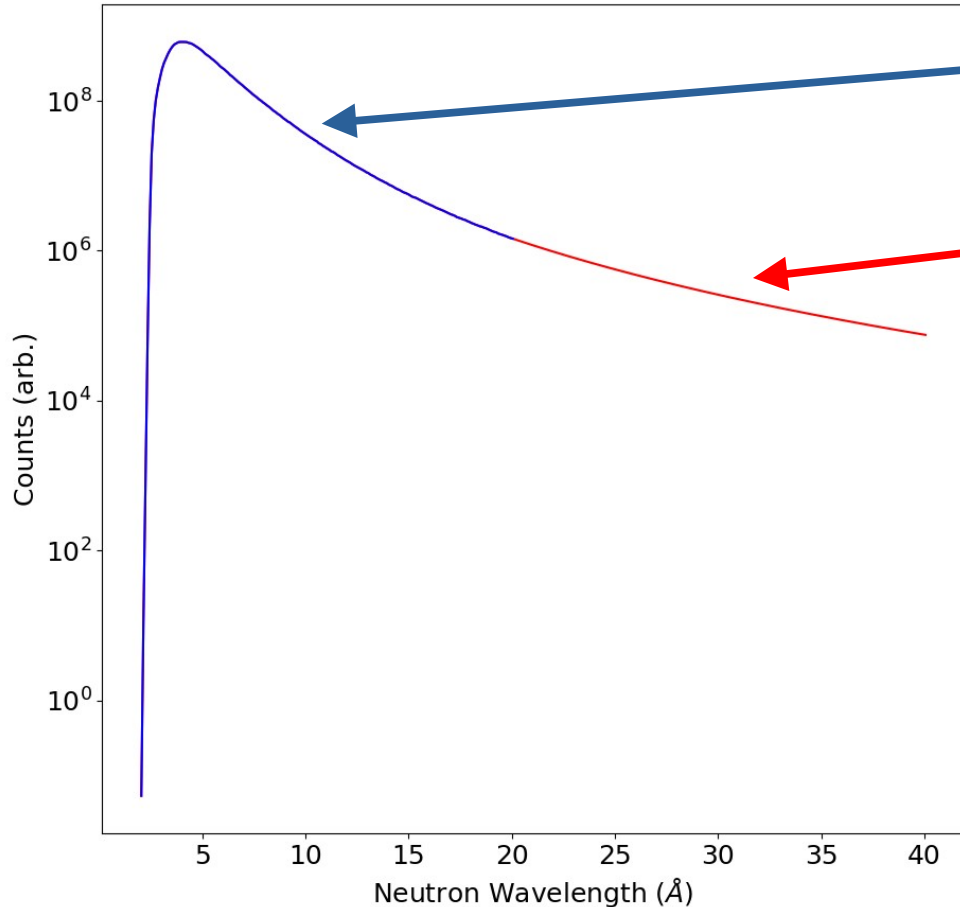


Same magnetic field map as for SNS 2020 PRD

This isn't technically correct: vacuum extension pipe interferes with magnetic field at low values, estimated at ~ 10 G \Rightarrow 0.06 neV

Extension pipe's effect on magnetic field is negligible for 2.4, 3.6, 4.8 T simulations

Velocity Spectrum



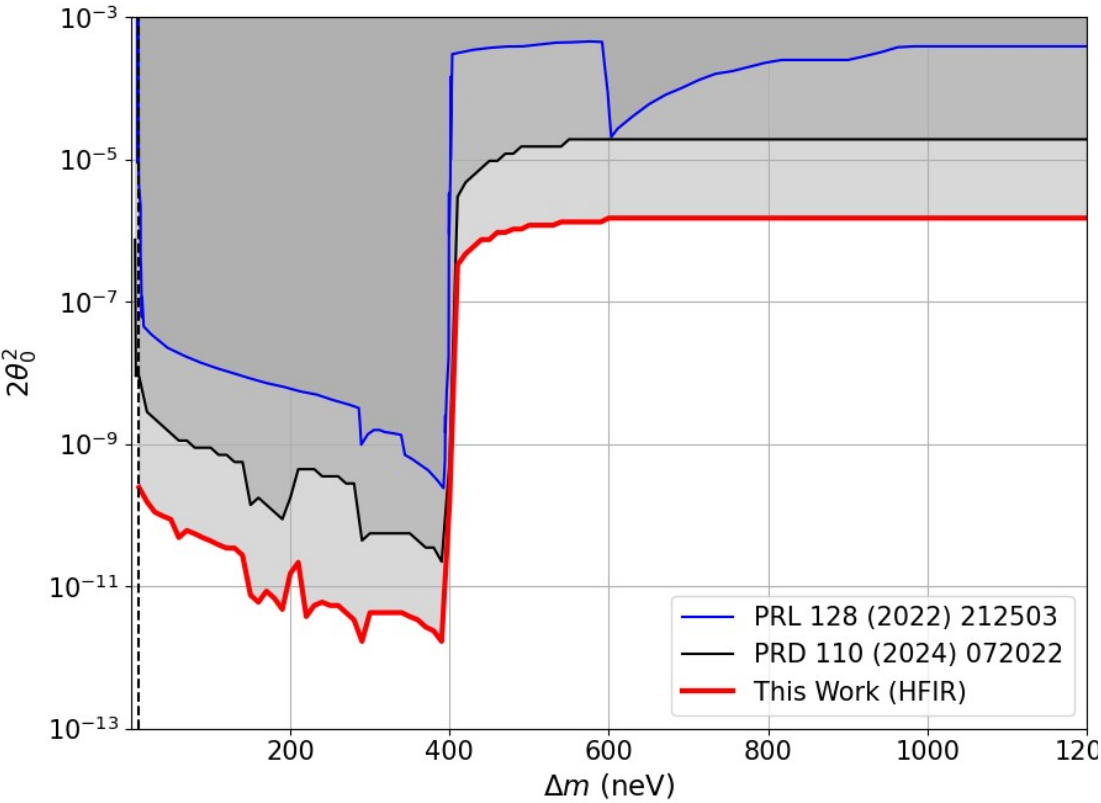
Spectrum based on measured, calculated (MCNP via ORNL) results

Extension from 20 Å to 40 Å extrapolated, not from ORNL

Counts of $\lambda > 20$ much less than for $\lambda \leq 20$
Effects of gravity non-negligible consideration

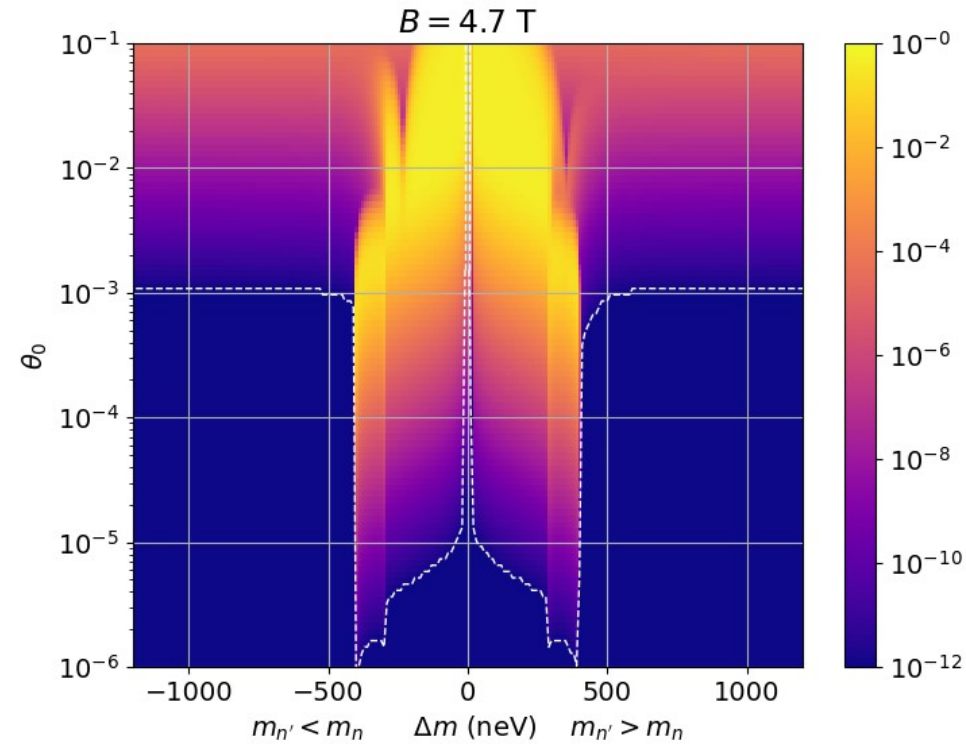
Previous presentations (August, December '24) presented contribution: ~6% despite increased sensitivity or ROI used

Butterfly and Comparison



HFIR 2024 is $\sim 40x$ more sensitive in parameter space than SNS 2019 PRL and $\sim 10x$ more than SNS 2020 PRD

Butterfly is not appreciably different for HFIR
Limit cuts lower – still waiting for final intensity result



Preliminary Comparison to “World Data”

Proposal: nTMM will cover the same low-value magnetic field values as HFIR 2024 with greater sensitivity => do not run small-value simulations for HFIR?

