Agenda of ORNL-UTK-UKY-LU zoom meeting
February 24, 2026, at 3:30 PM EST

Please, send your slides for INDICO posting

https://indico.phy.ornl.gov/event/979

Agenda:

1.	Andy	5'	Progress with paper editing
2.	Yuri	5'	Beam request IPTS proposal due March 3
3	Nathan and Linus	15'	Progress with calculations for the PRD paper
4.	John	5'	Pressure measurement scheme for nTMM
6.	Mubi	10'	UKY updates
7.	Linus	10'	LU updates
8.	Shaun	5'	pressure measurement update
9.	AOB		

The Proposal requesting beam time at GP-SANS in the Fall 2026

is due March 3, 2026

draft of the proposal IPTS-34190.1

can be accessed through user.ornl.gov site in HFIR Pre-Submission section.

Request is for 5 days (including disassembly and vacuum restoration)

Simulation Studies

Nathan Whittington, UTK

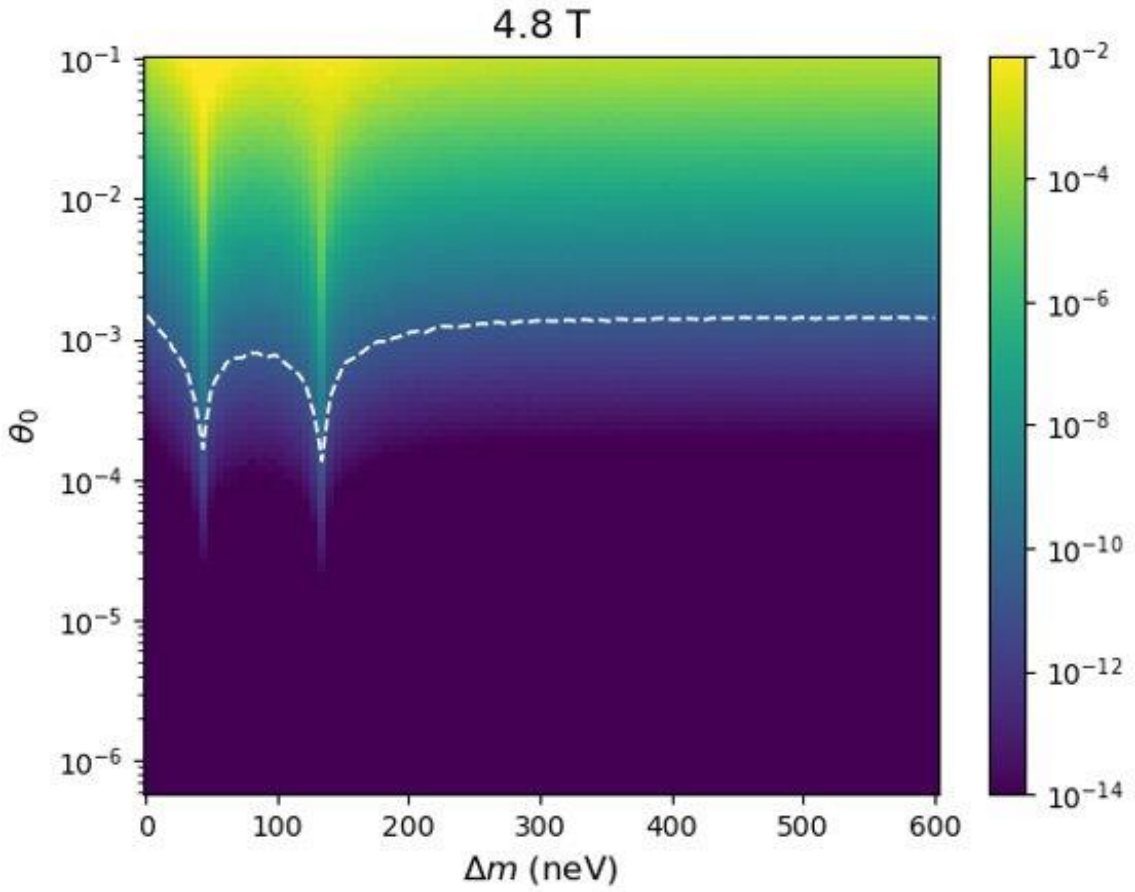
2/24/26

Two Beam Polarizations

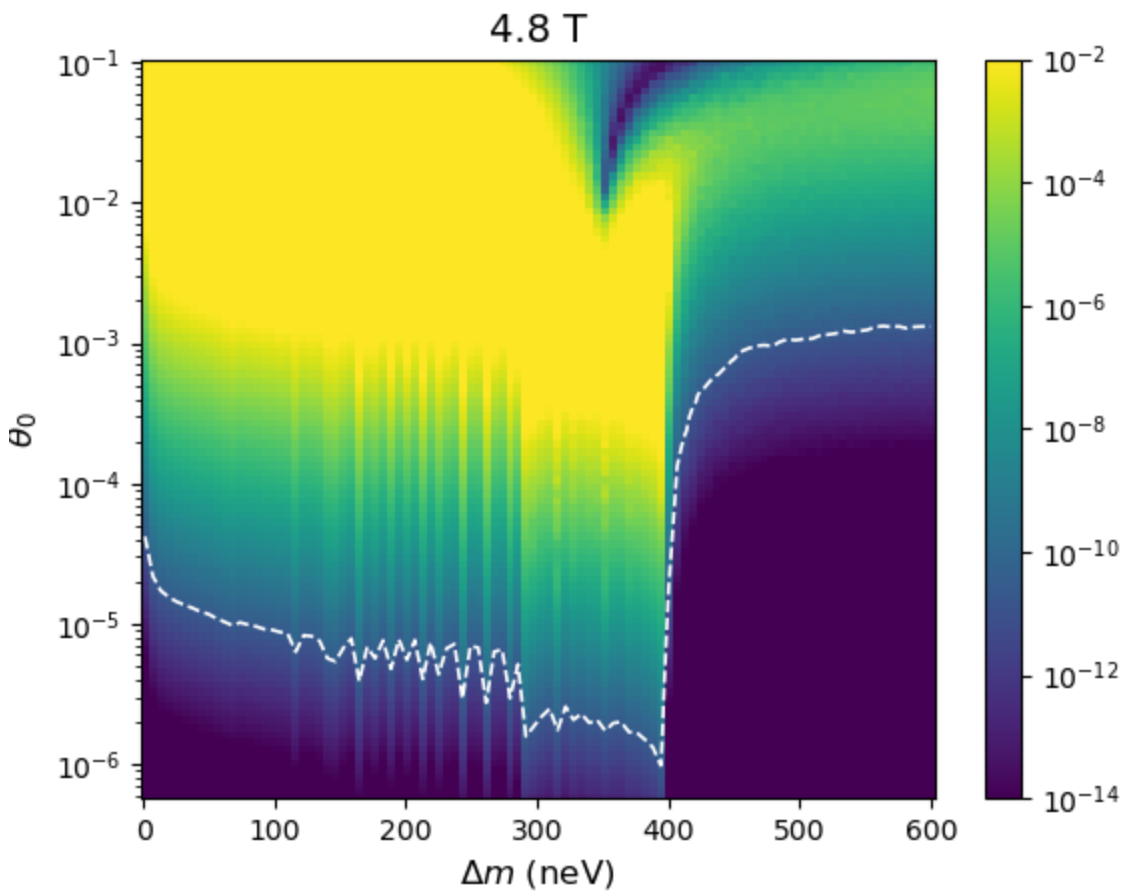
- We want: $V - \Delta m \pm \mu B = 0$
- $\mu B > 0$ for positively polarized n
- $\mu B < 0$ for negatively polarized n
- Beam in experiment is unpolarized

Positive Δm

- 1mm
- 100 vel
- $V_{Cd} = 59\,neV$
- B extrap. at 30 cm



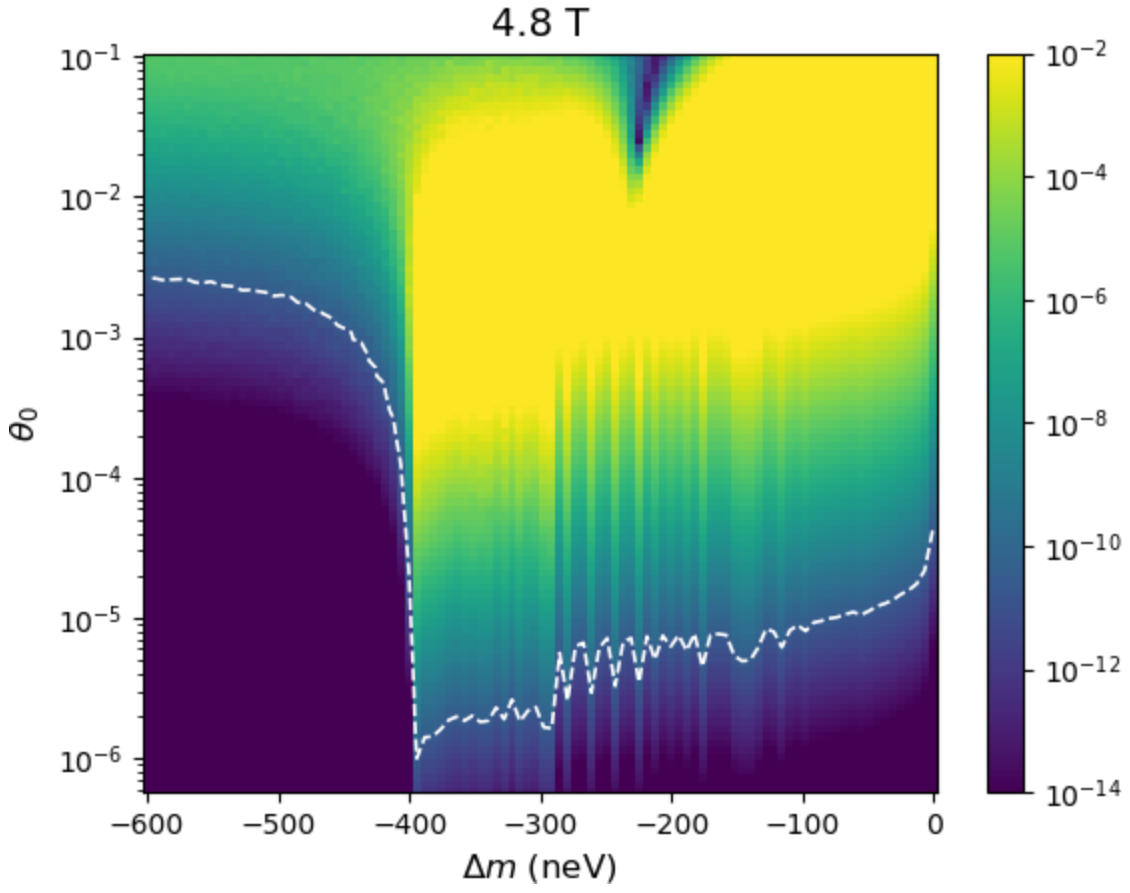
V - Δm **-** μB



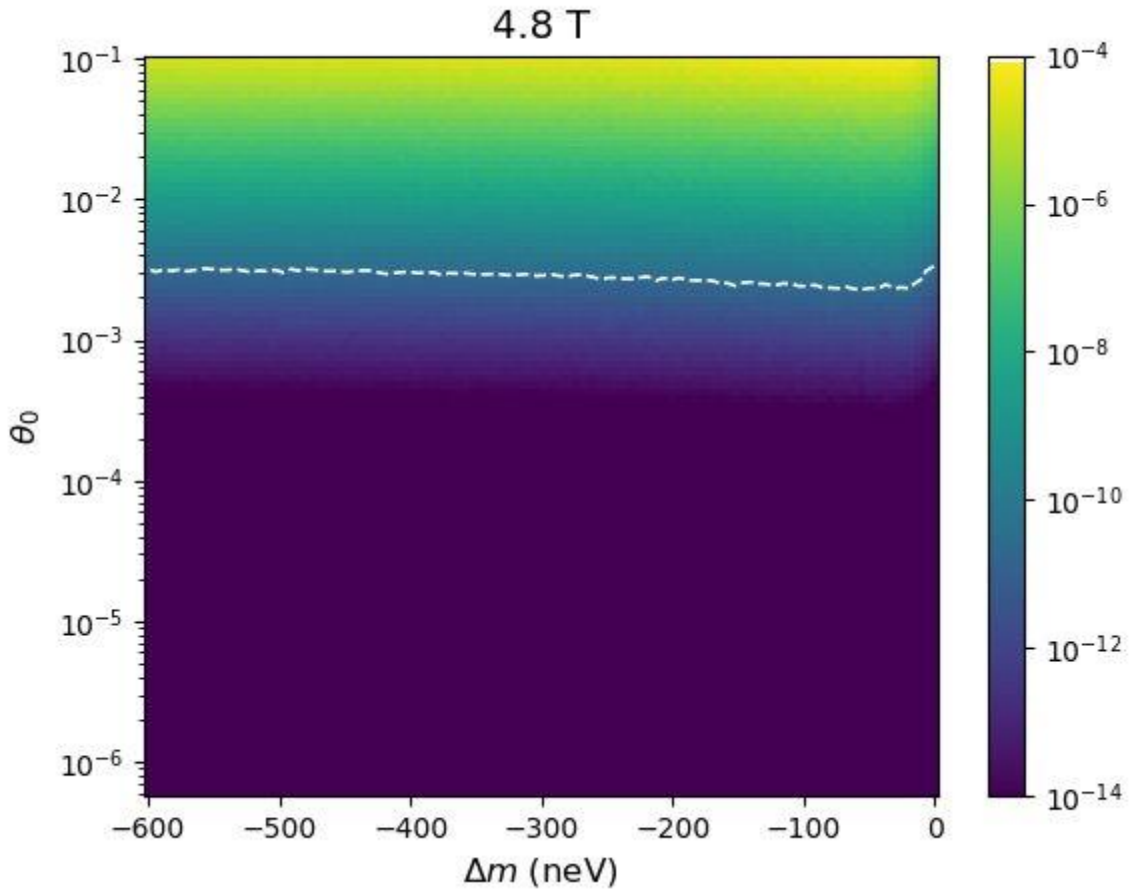
V - Δm **+** μB

Negative Δm

- 1mm
- 100 vel
- $V_{Cd} = 59\ neV$
- B extrap. at 30 cm



V - (-Δm) **-** μB



V - (-Δm) **+** μB

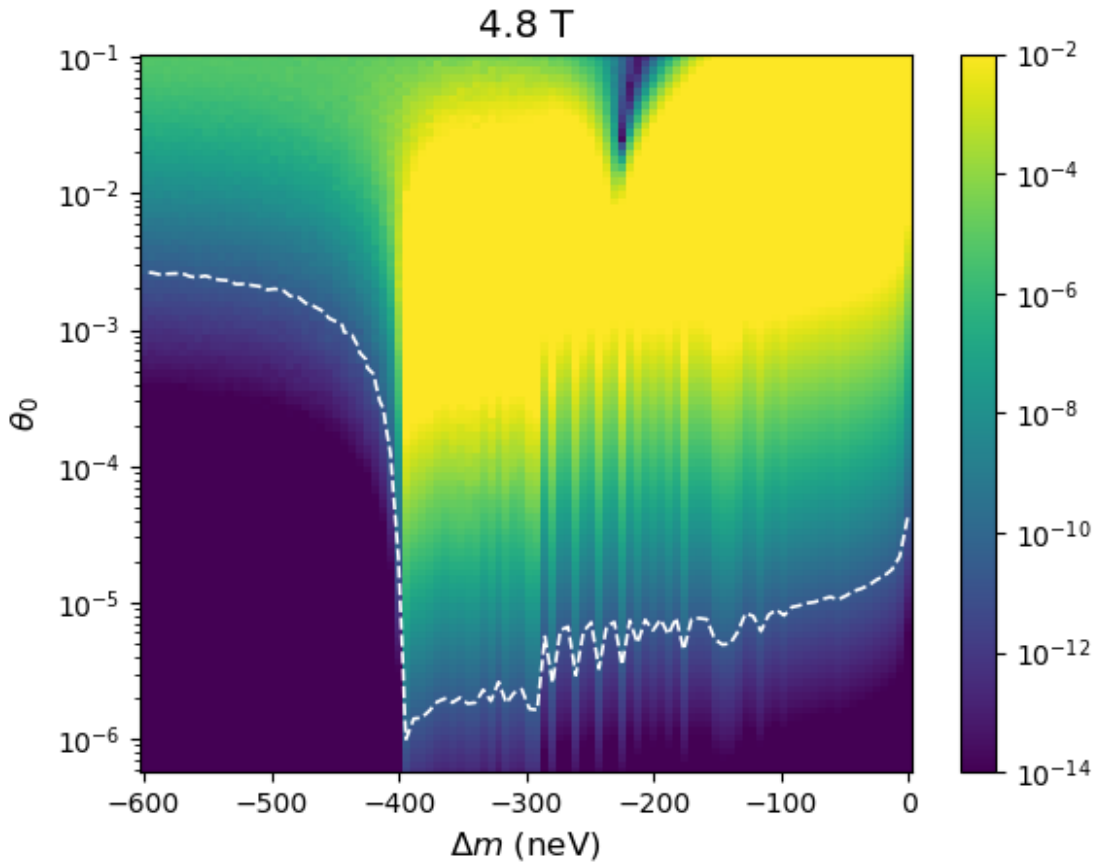
Combining Polarizations

- In experiment, the limit of regeneration probability $O(10^{-11})$ is in units "per neutron"
- So, in simulation two polarizations should be averaged to compare with the "per neutron" analysis

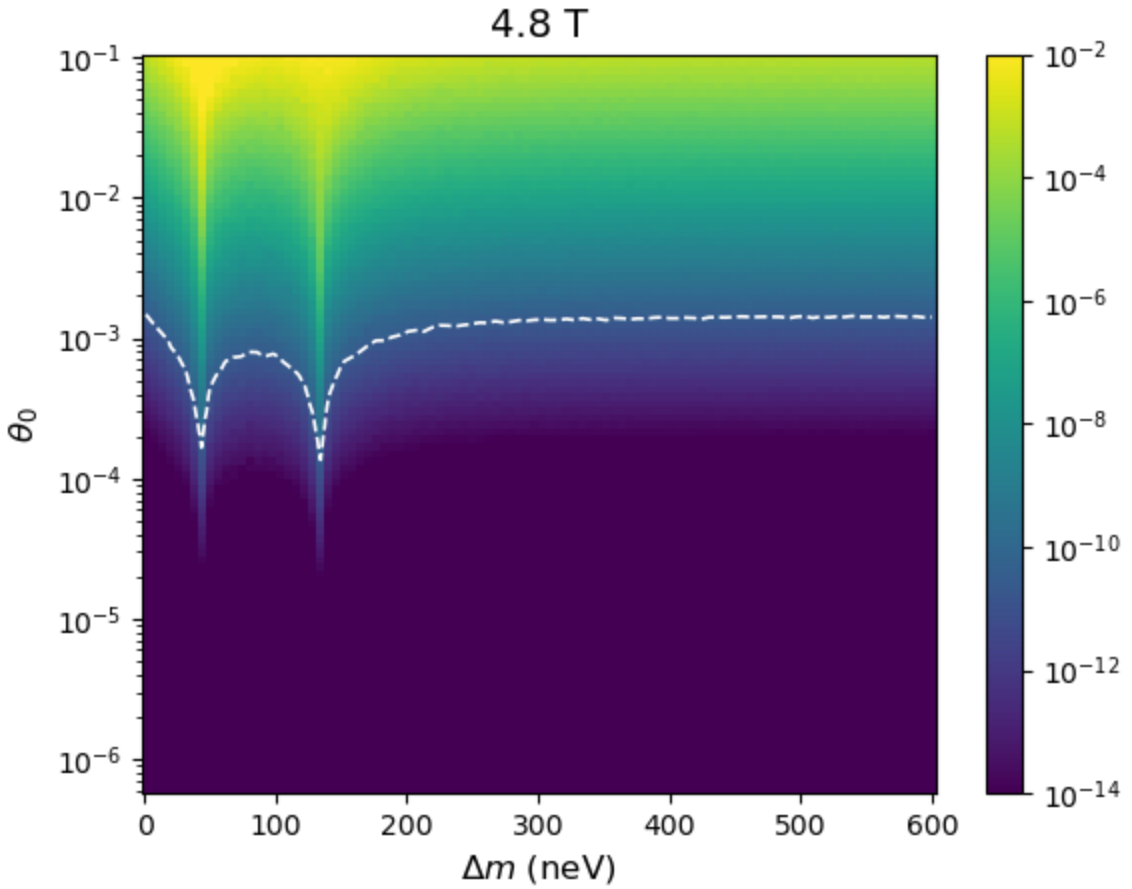
Study on Changing V_{Cd}

- 1mm
- 100 vel
- -μB

- $V_{Cd} = 58.77$ neV
- Limit min at -394.3 neV
- Abs. Res. Tip at -225 neV



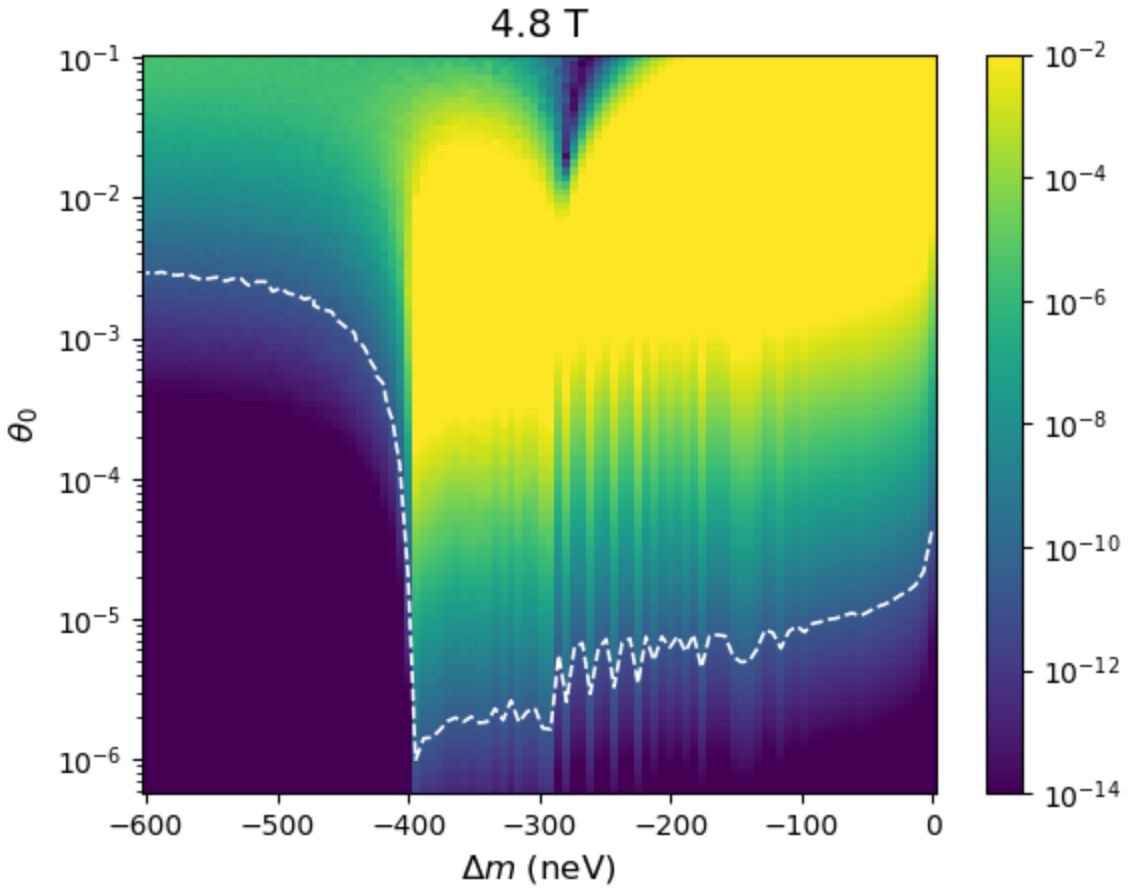
- $V_{Cd} = 59$ neV
- Peaks at 43.4 and 131.4 neV



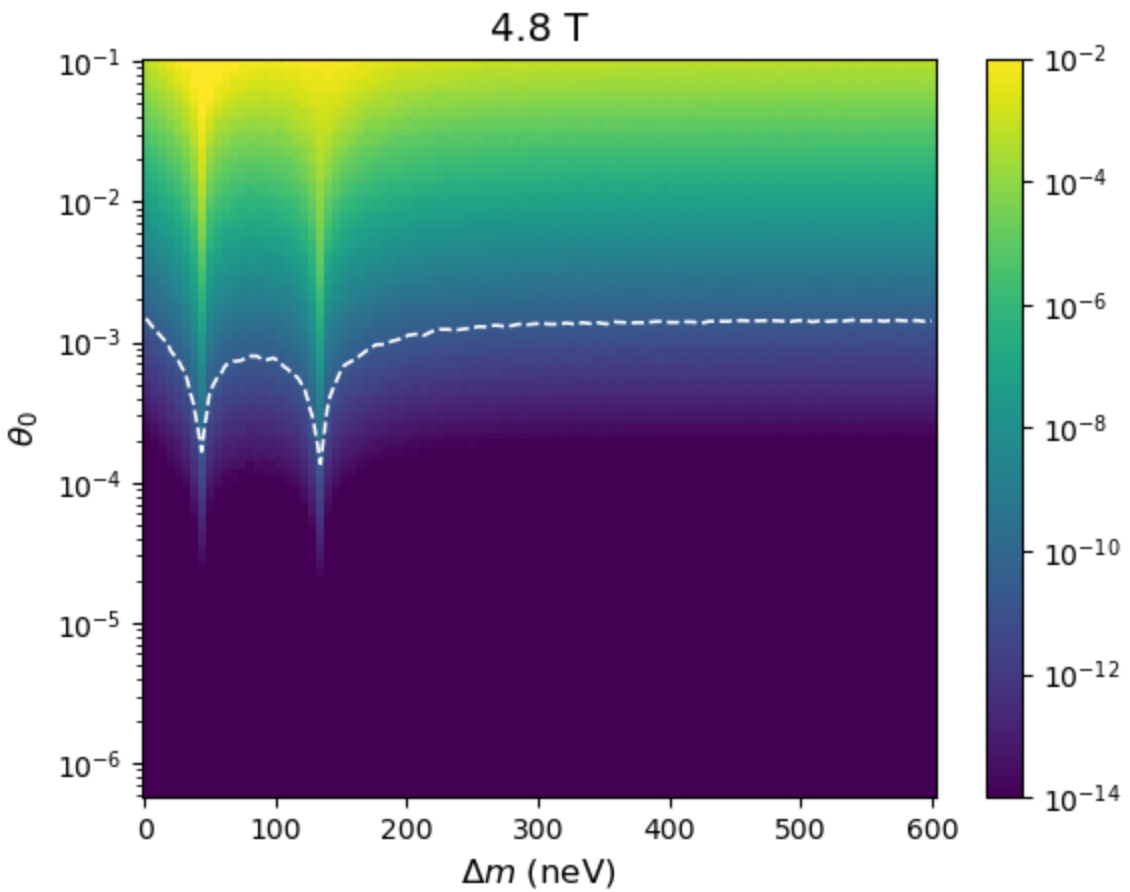
Study on Changing V_{Cd}

- 1mm
- 100 vel
- -μB

- $V_{Cd} = 5$ neV
- Limit min at -394.3 neV
- Abs. Res. Tip at -279.3 neV



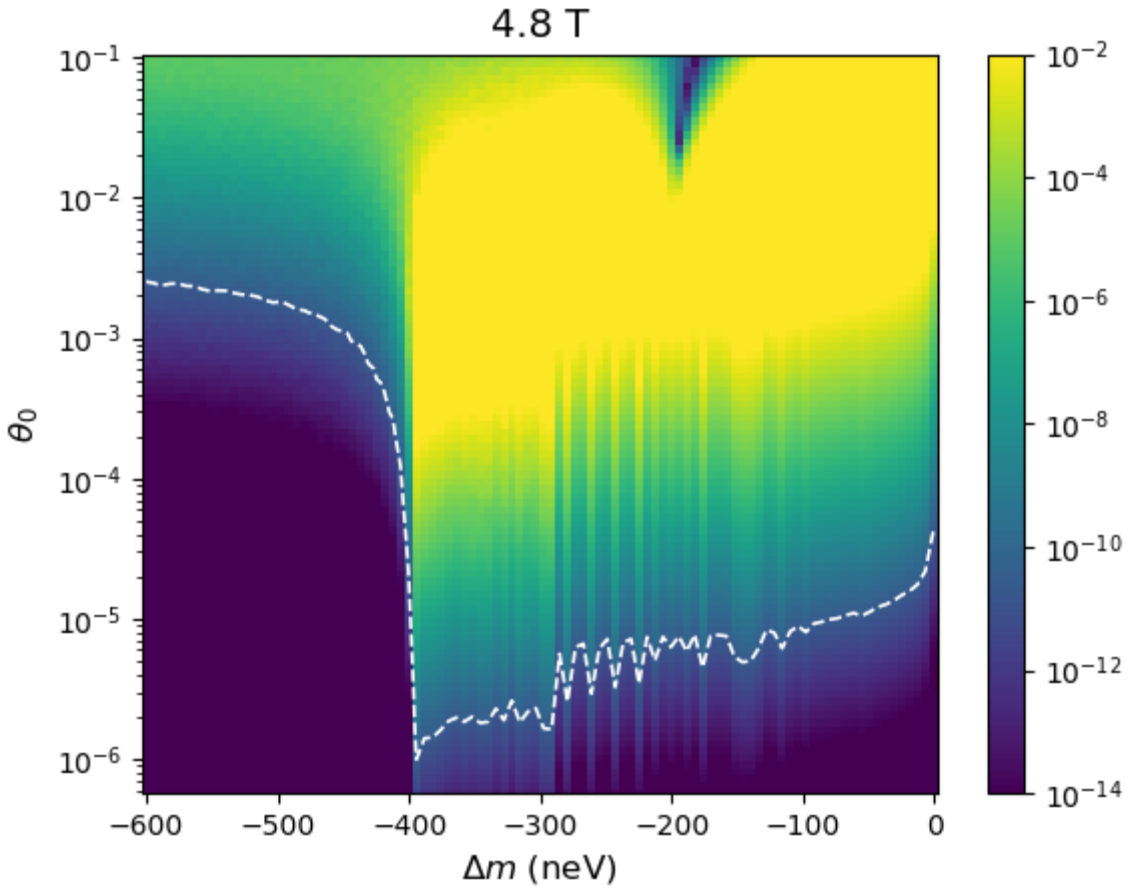
- $V_{Cd} = 5$ neV
- Peaks at 43.4 and 134 neV



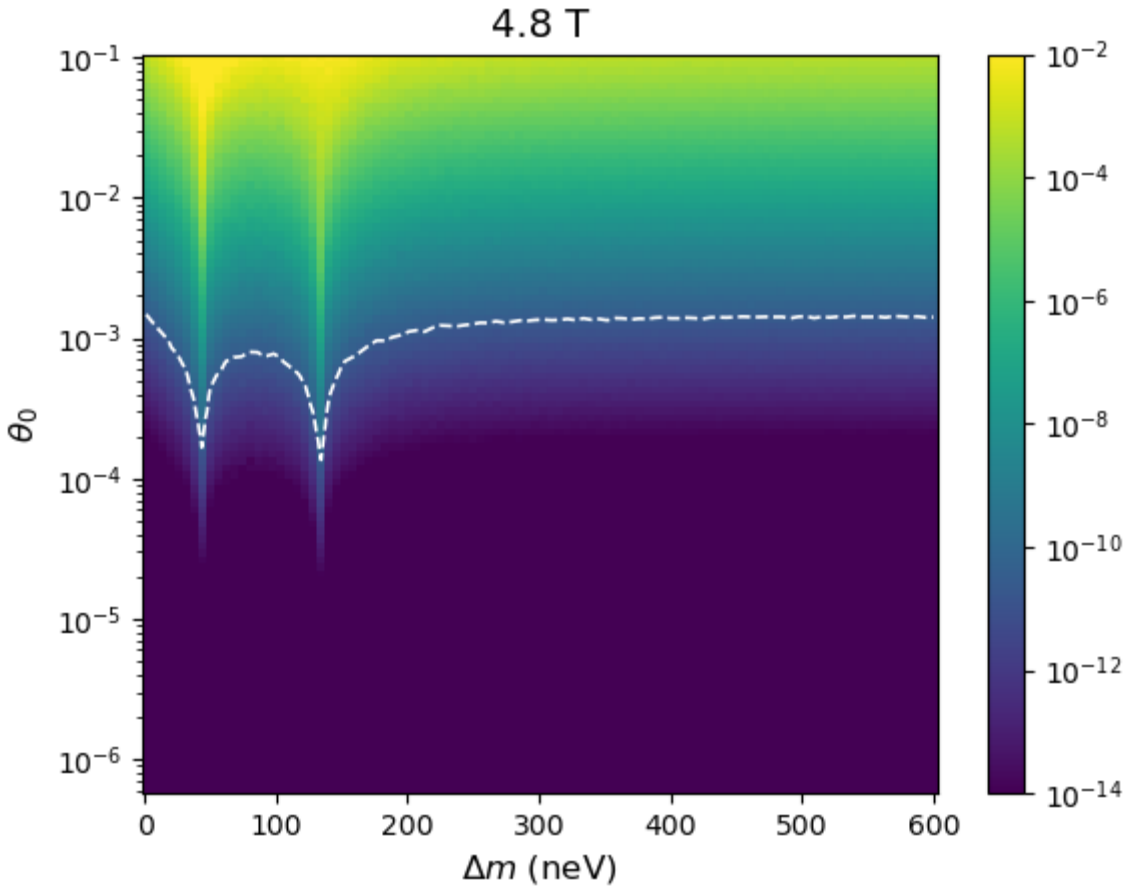
Study on Changing V_{Cd}

- 1mm
- 100 vel
- -μB

- $V_{Cd} = 90$ neV
- Limit min at -394.3 neV
- Abs. Res. Tip at -193.9 neV

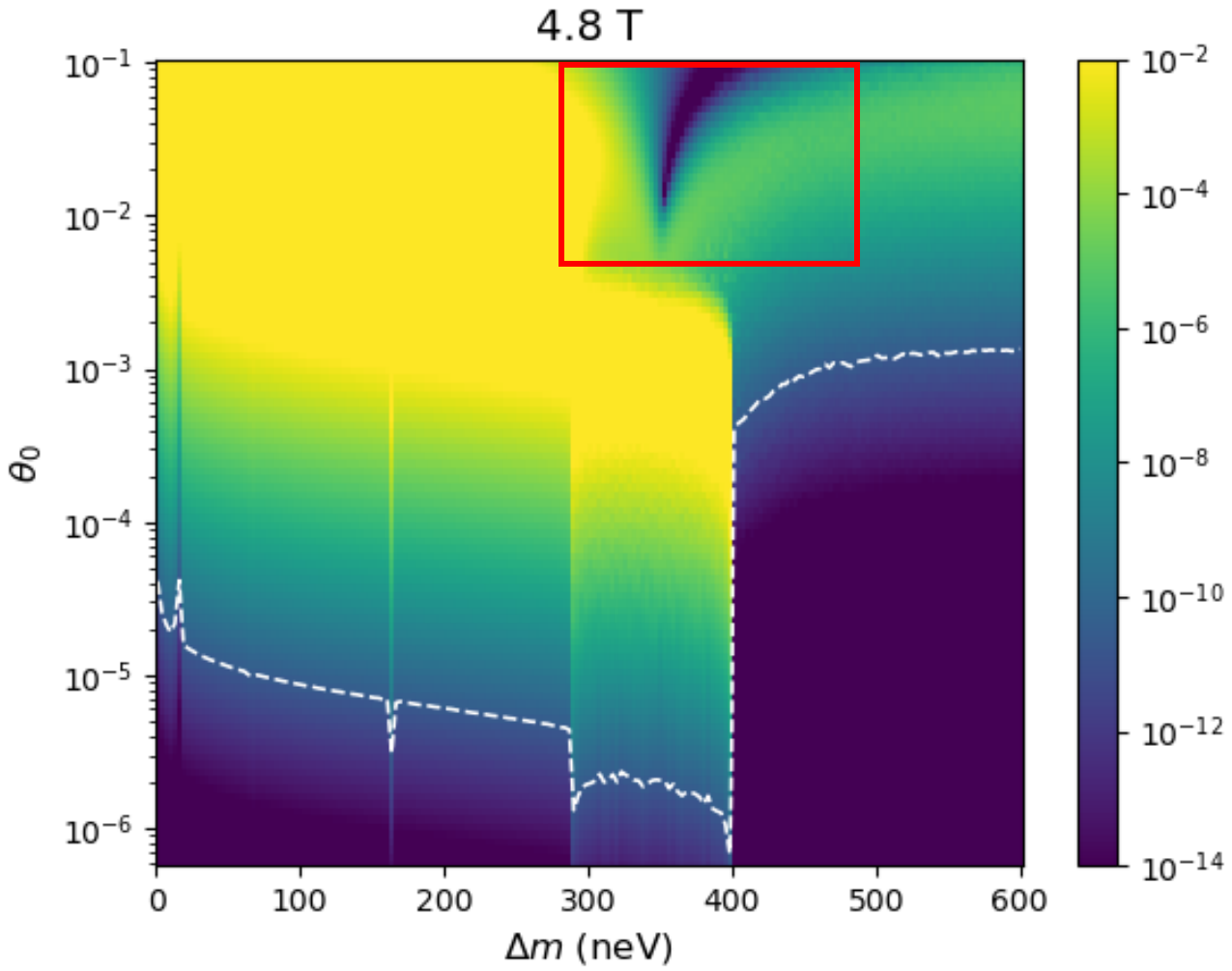


- $V_{Cd} = 90$ neV
- Peaks at 43.4 and 134 neV



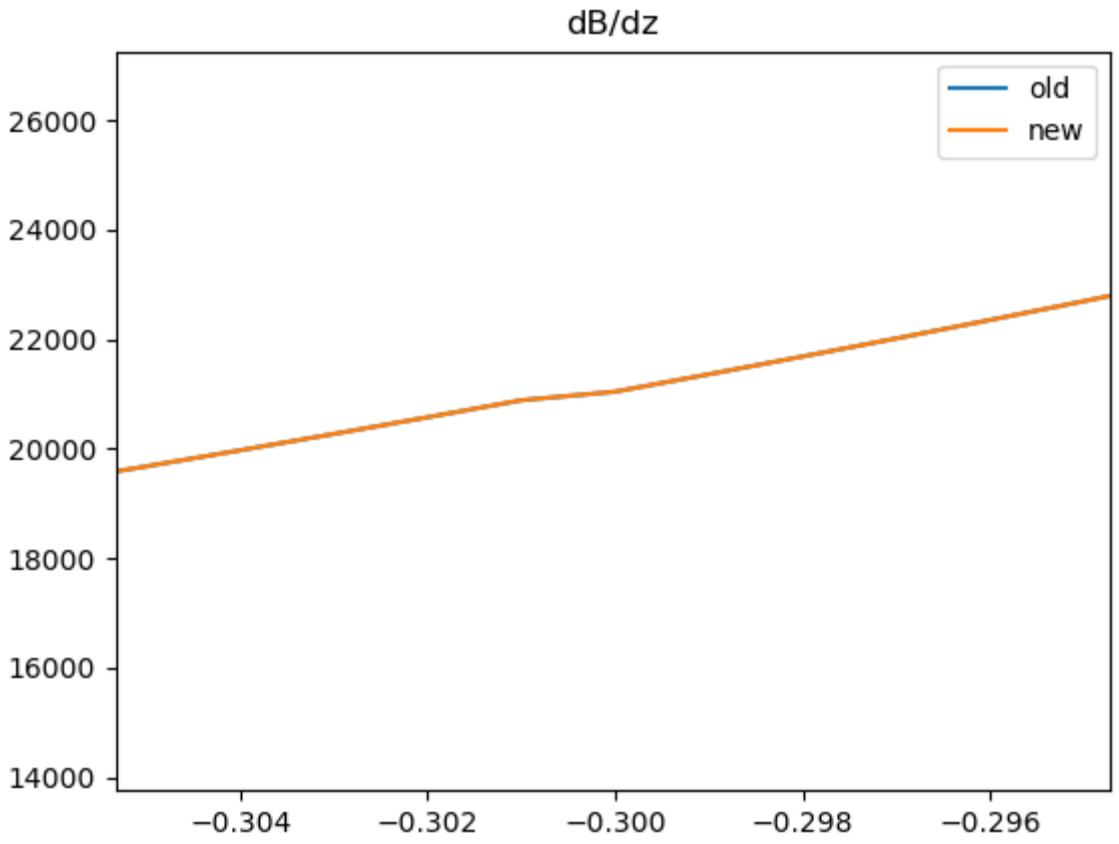
Absorption Resonance

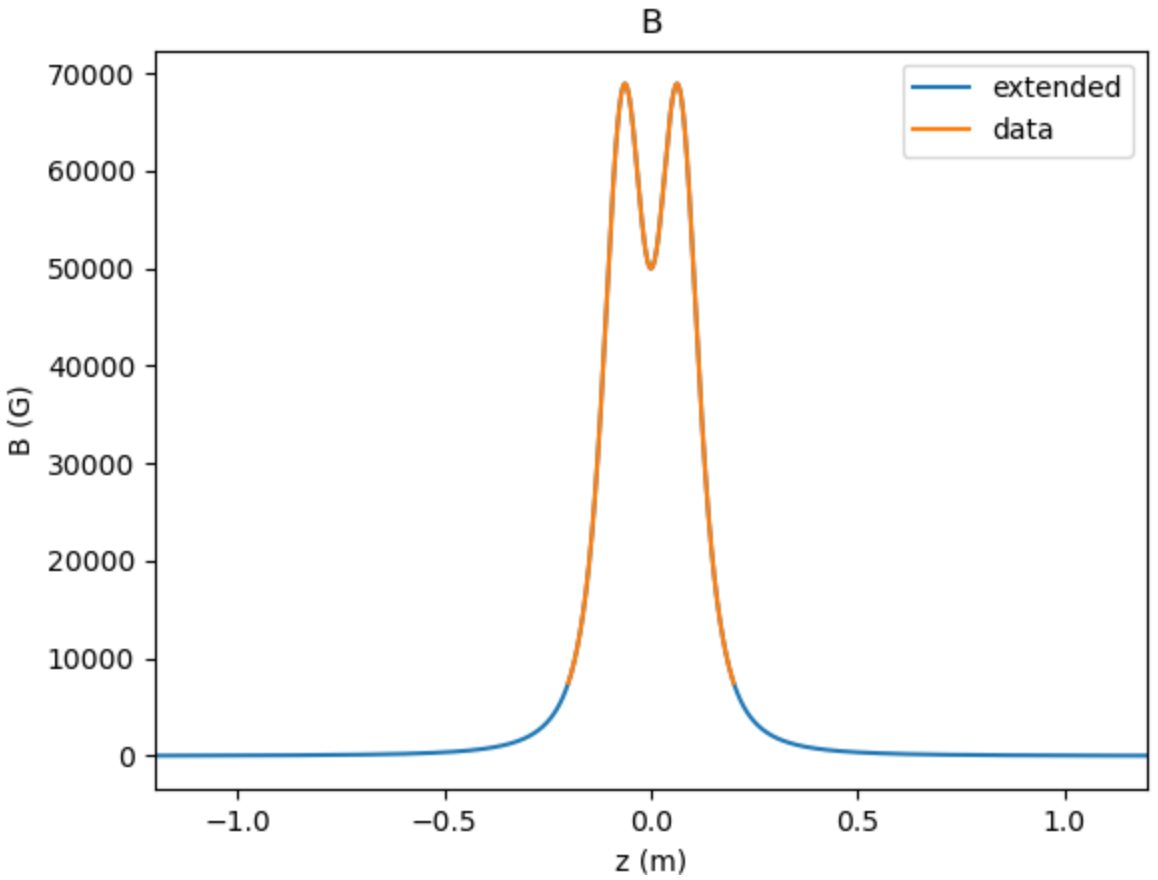
- When dm = muB + V_{Cd}, and θ is large
- μB ~289 neV
- V_{Cd} ~ 59 neV
- Mirror neutrons oscillate strongly in the Cd and are absorbed



Study on Changing B extrapolation

- @30cm, B = 1870 G, μB = 11.228 neV
- Tail: B_{min} = 9.24 G, μB = 0.0556 neV

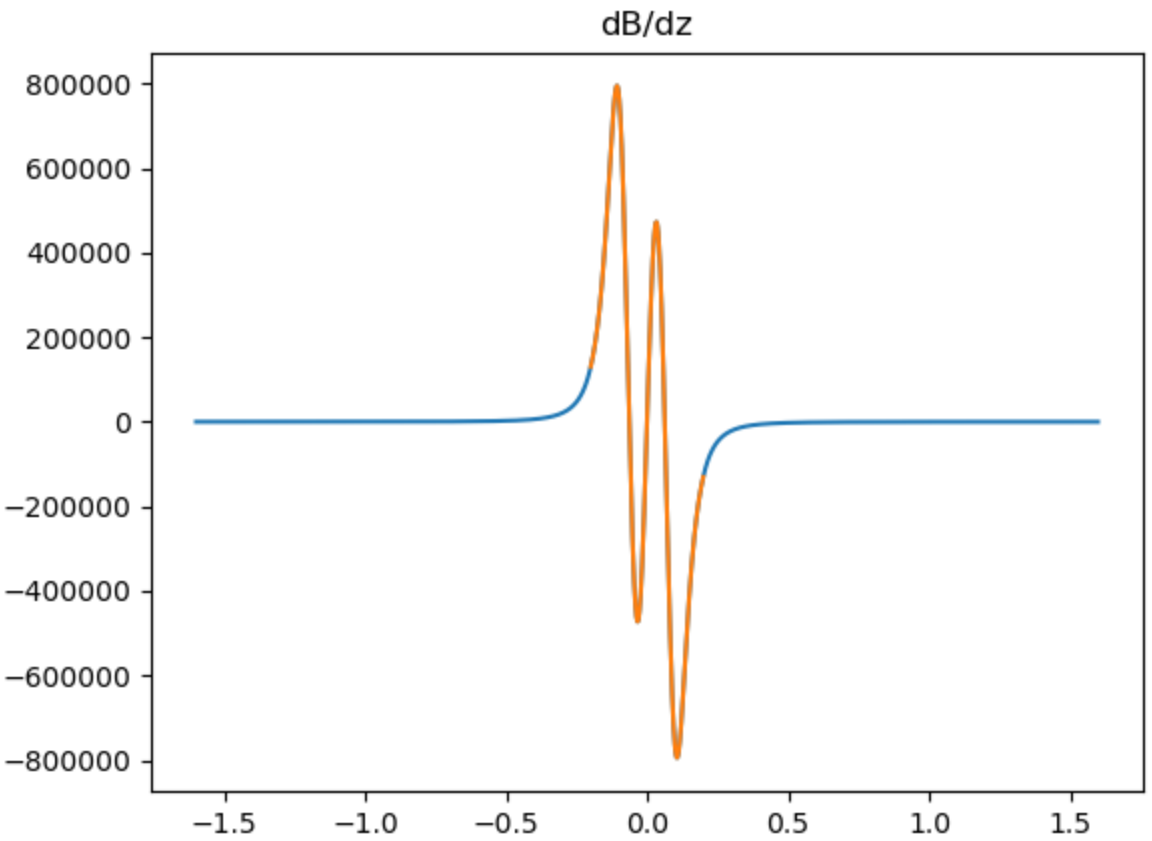


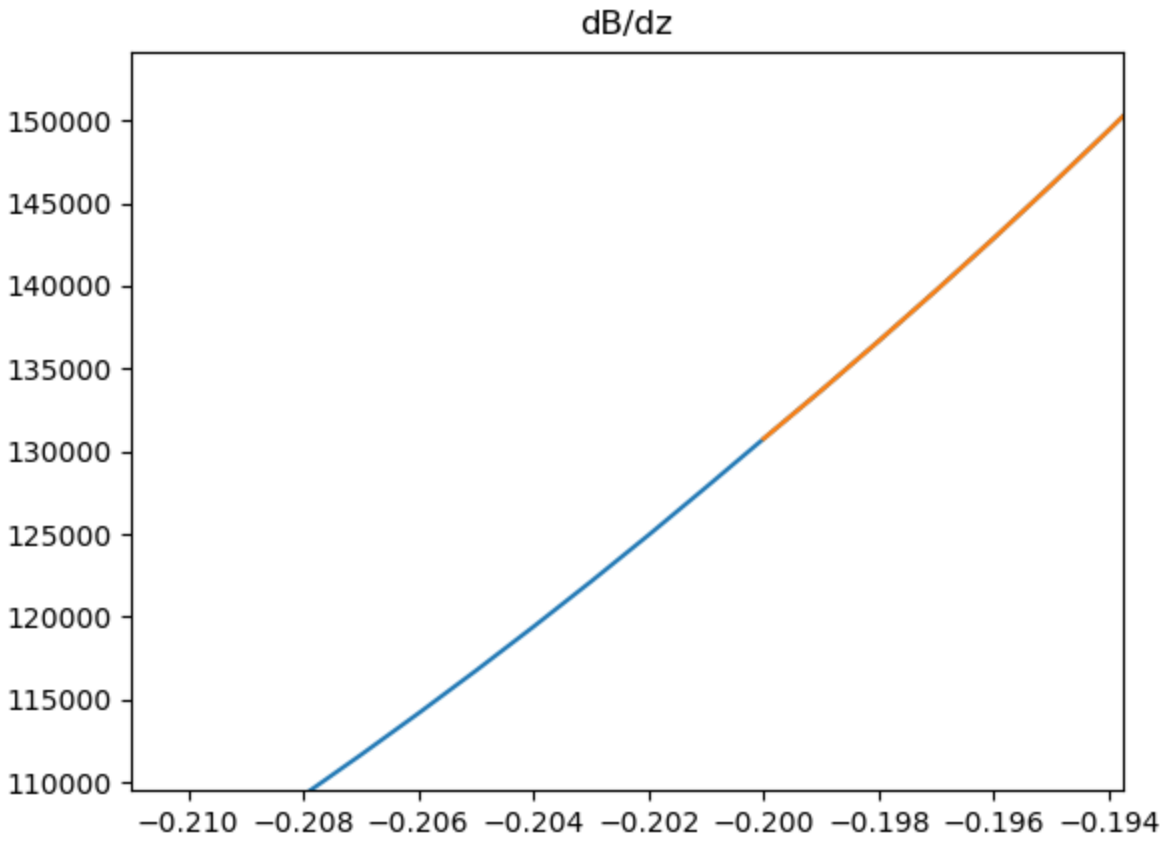


Study on Changing B extrapolation

- @20cm, B = 7490, μB = 45 neV
- Tail: B_{min} = 10.08 G, μB = 0.0606 neV

- $B_{start} = \pm$20cm
- @20cm => No jump in derivative

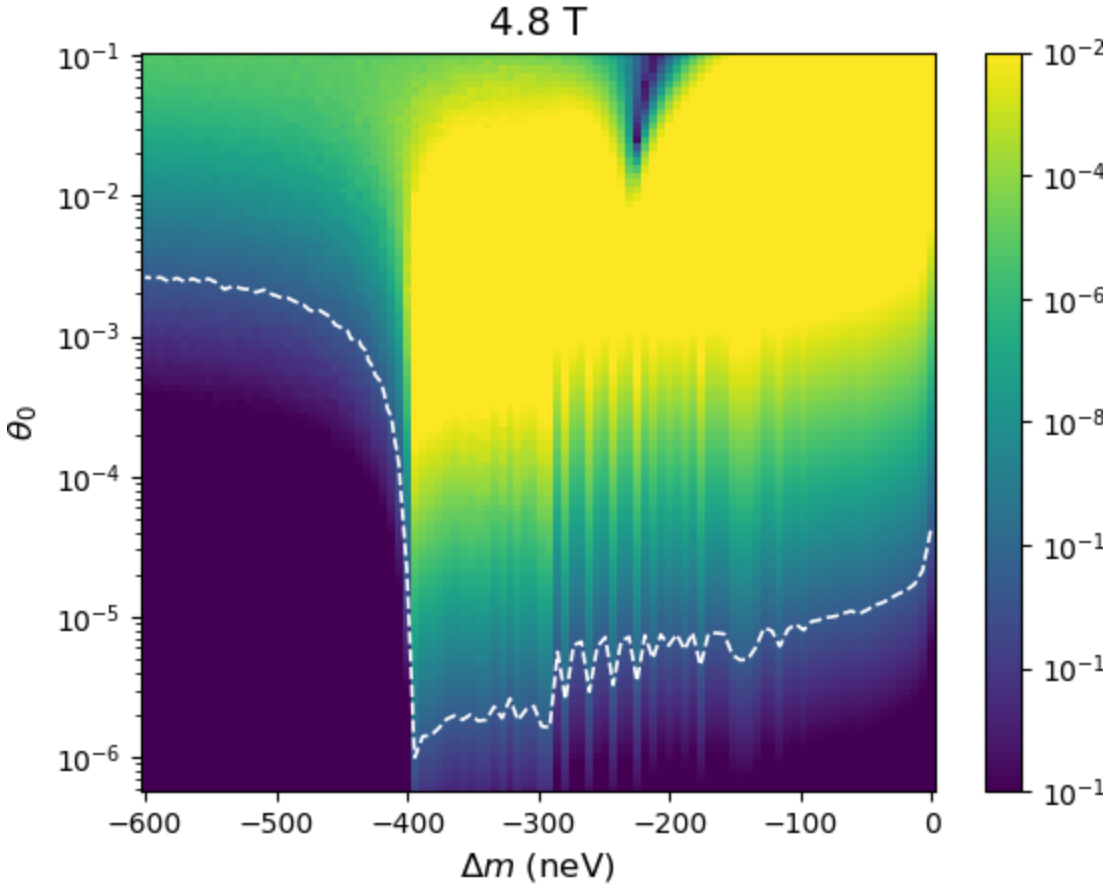




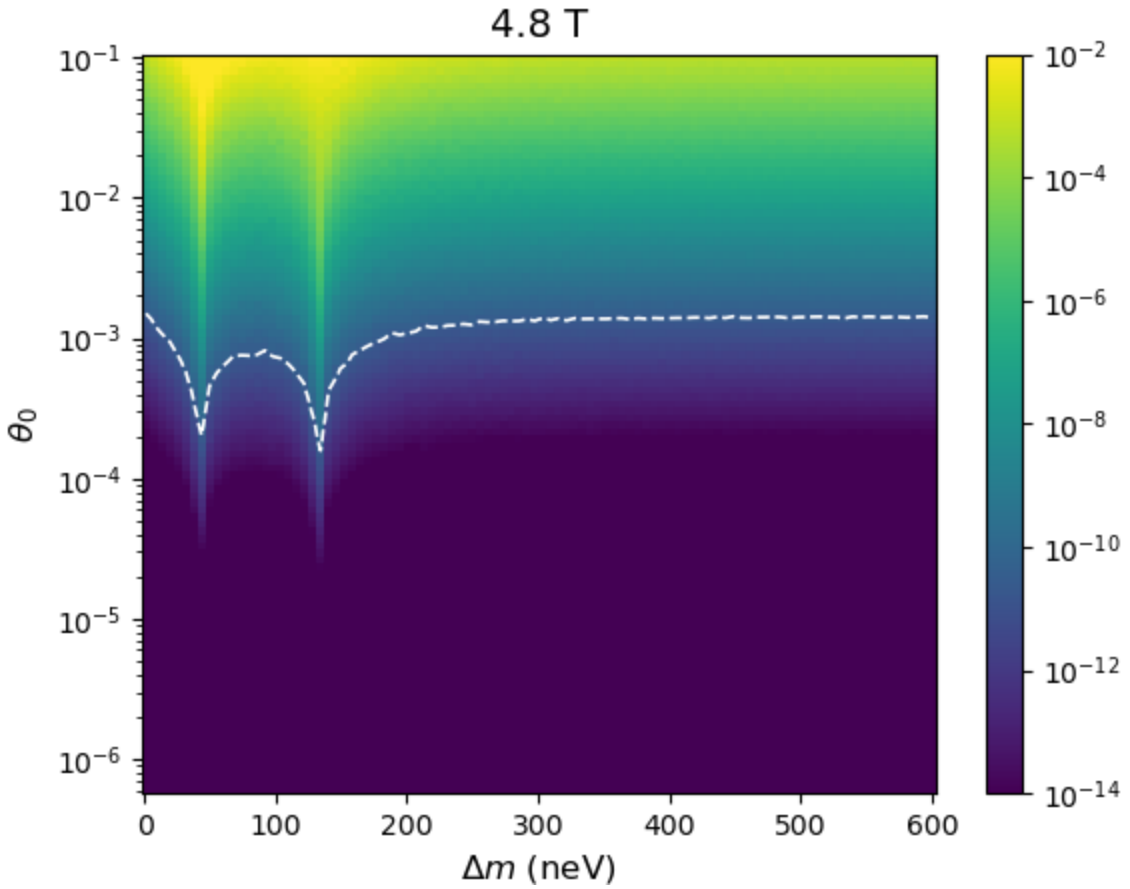
Study on Changing B extrapolation

- 1mm
- 100 vel
- -μB

- **ext. @20cm**
- Limit min at -394.3 neV
- Abs. Res. Tip at -225 neV



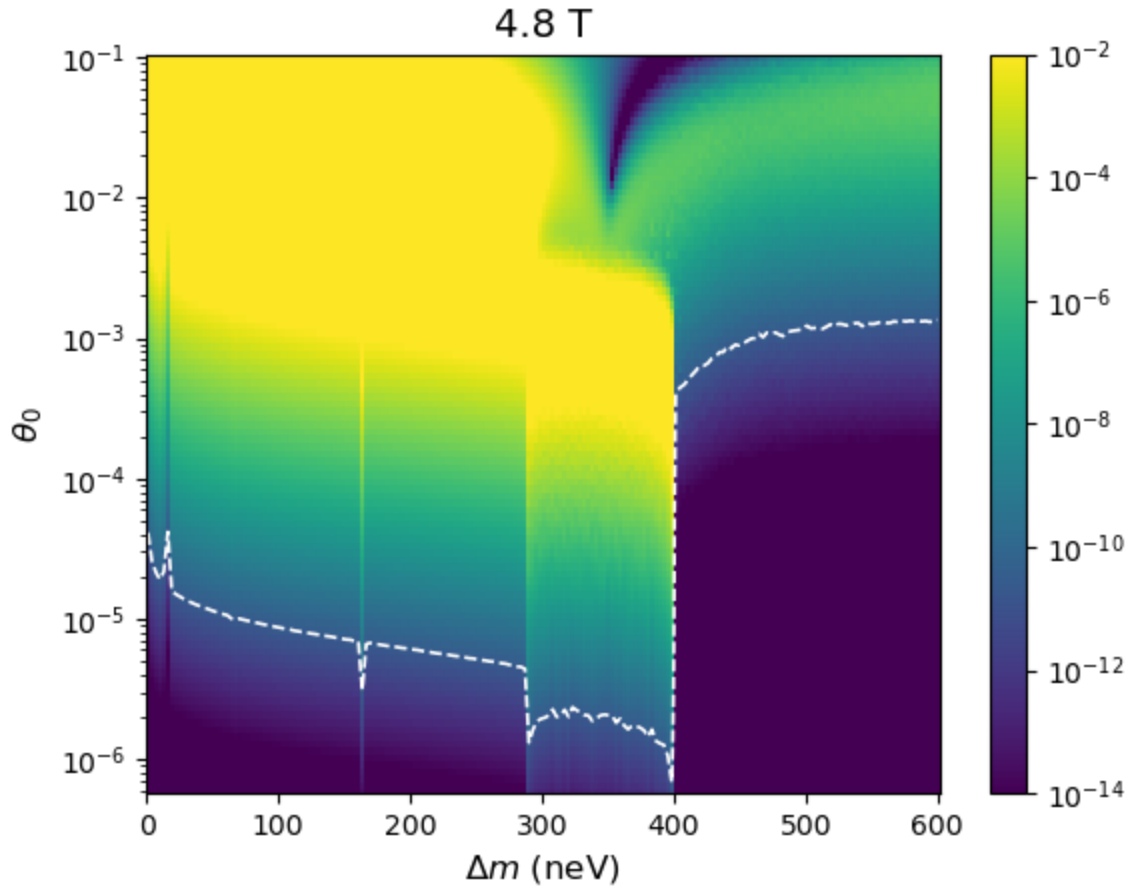
- Peaks at dm = 43.4 and 134 neV
- **no change overall**



- 100 vel
- +μB
- Dm > 0

Higher Parameter resolution

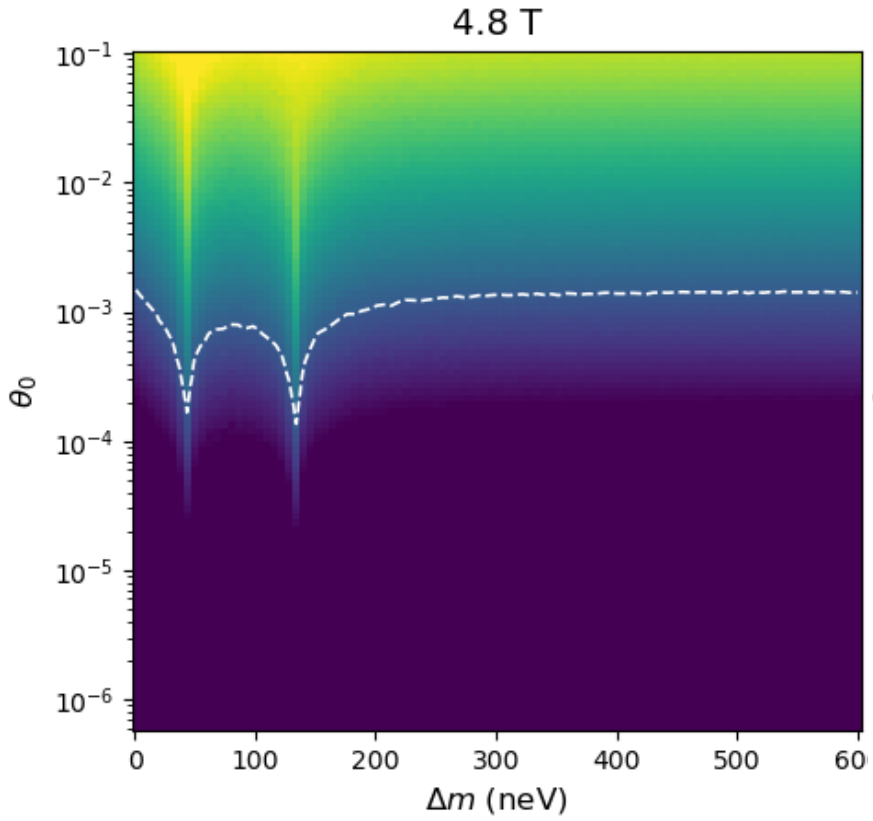
- B extrapolation at +-20cm
- Spikes at Dm = 16.1, 164 neV
- Spikes more narrow (one dm strip)



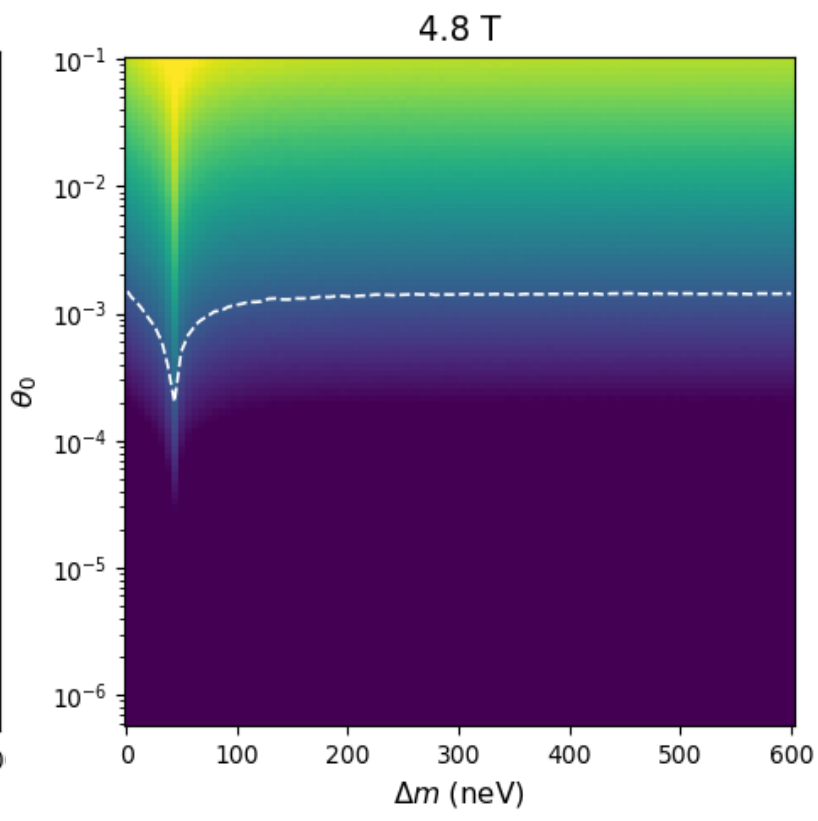
Dm > 0, Positive Polarization

- 100 vel
- +μB
- Dm > 0
- Zstep = 0.1mm

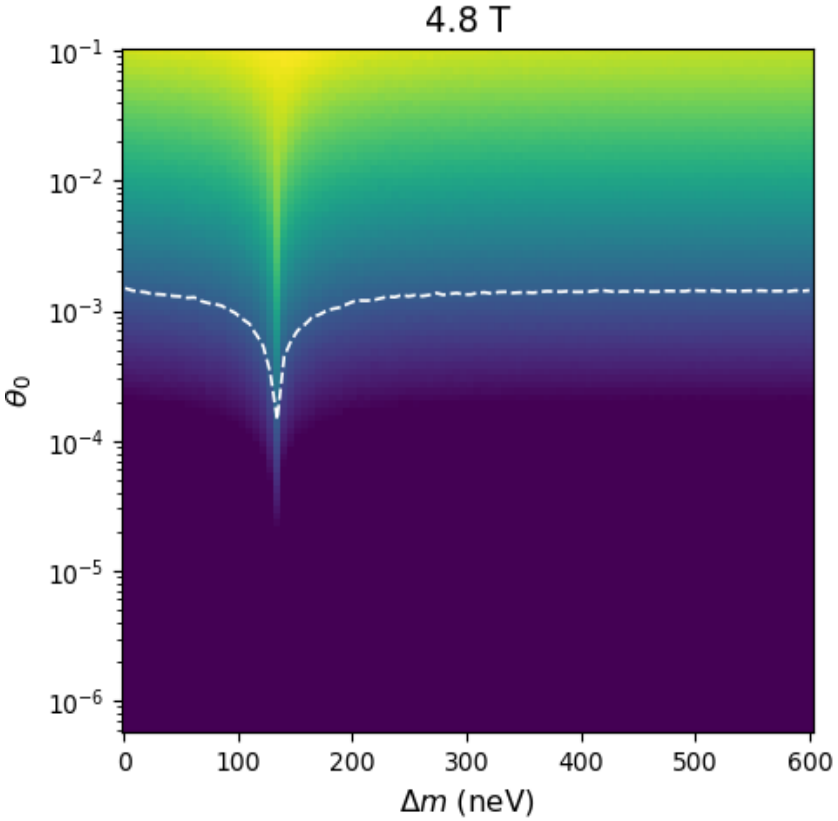
Normal Setup



Sapphire Window Removed



Silicon Window Removed



Conclusions

- B extrapolation location has no effect (Will start to use @29cm)
- Absorption resonance behavior is normal
- Two peaks at $\Delta m > 0$ and $\mu B < 0$ are from Si and Sapp. Windows
- Two Polarization distributions should be averaged for final result

- Other peaks should be investigated

Simulation for 2024 paper using Julia

2026-02-24

linus.persson@fysik.lu.se

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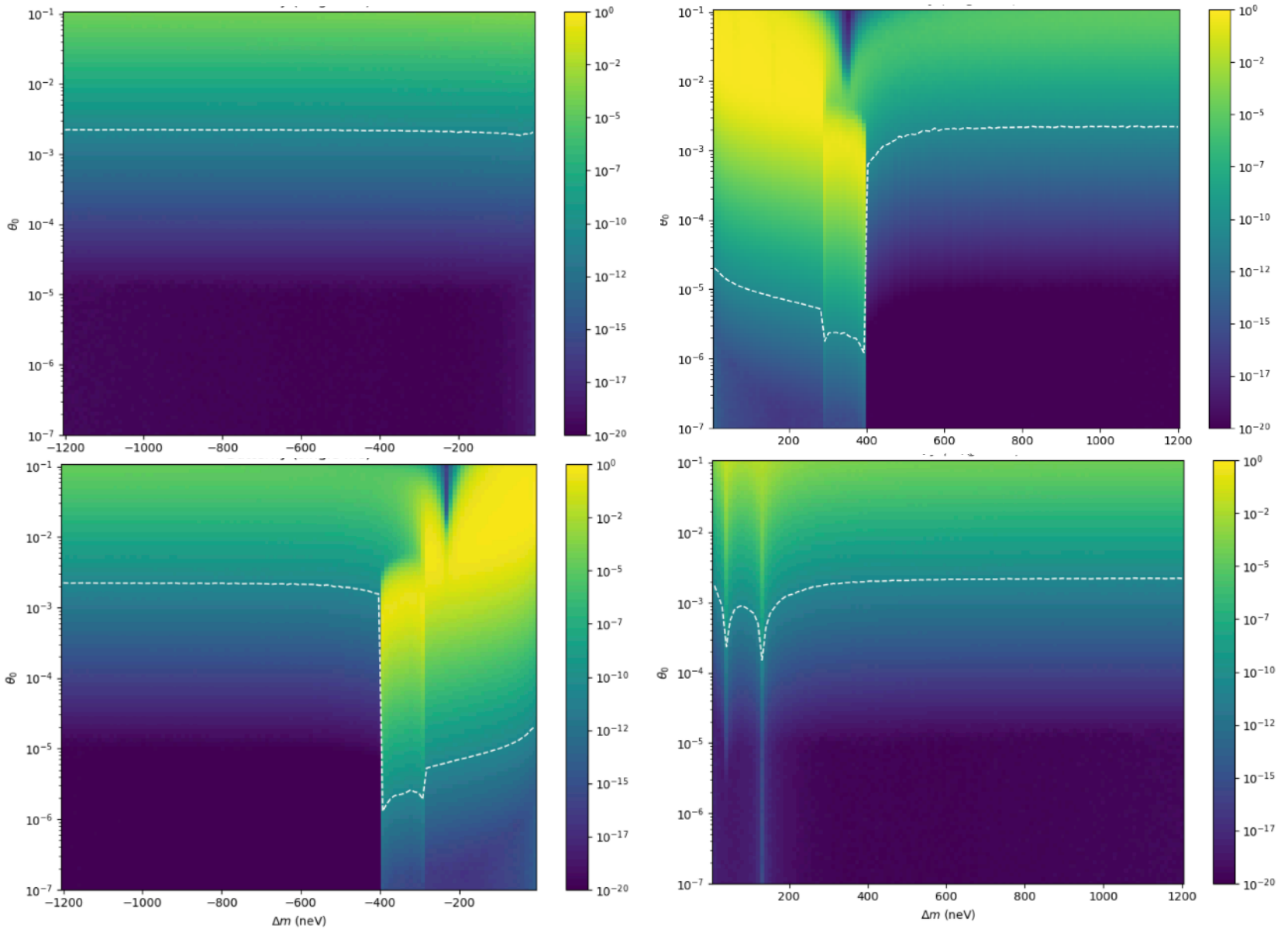
Current status

- Simulation of negative polarization and negative Δm produced expected results. Now have runs of all 4 configurations (pos/neg Δm, pos/neg pol.)
- Started to run with smaller mass range 0.01-20 neV, but only for positive polarization. Will try to run the other options soon.
- What is the cut criterion for $2\theta_0^2$ vs Δm plots?
- Other than butterfly plots for 10-1200 neV and 0.1-20 neV and the exclusion plot, is anything else needed? Should I rerun with 2000 velocities instead of 200?

B-Field (T)	Counts, h^{-1}	Signal ($\times 10^{-12}$)	95% CL
2.40	-9 ± 21	-6.34 ± 14.7	2.28×10^{-11}
3.60	13 ± 20	9.1 ± 14.0	3.65×10^{-11}
4.80	-3 ± 20	-2.1 ± 14.0	2.55×10^{-11}
All fields	0.63 ± 12	0.42 ± 8.4	1.69×10^{-11}

TABLE I. Limits on the $n \to n' \to n$ regeneration probability per neutron at 95% CL [22] with Cd absorber for different values of magnetic field settings. Data of 2024 run.

Results in 10-1200 neV range



$+\mu$

$-\mu$

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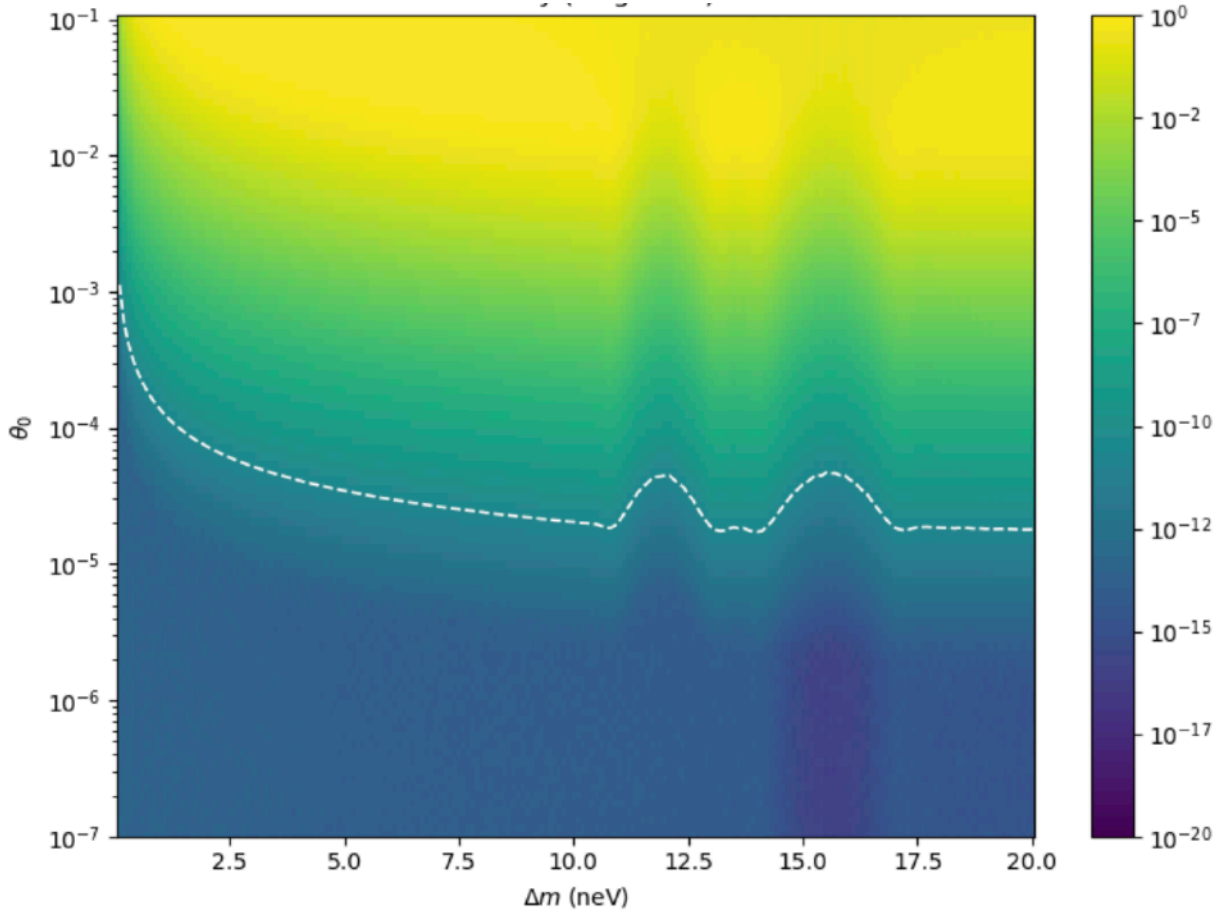
Results in 0.1-20 neV range



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Outlook

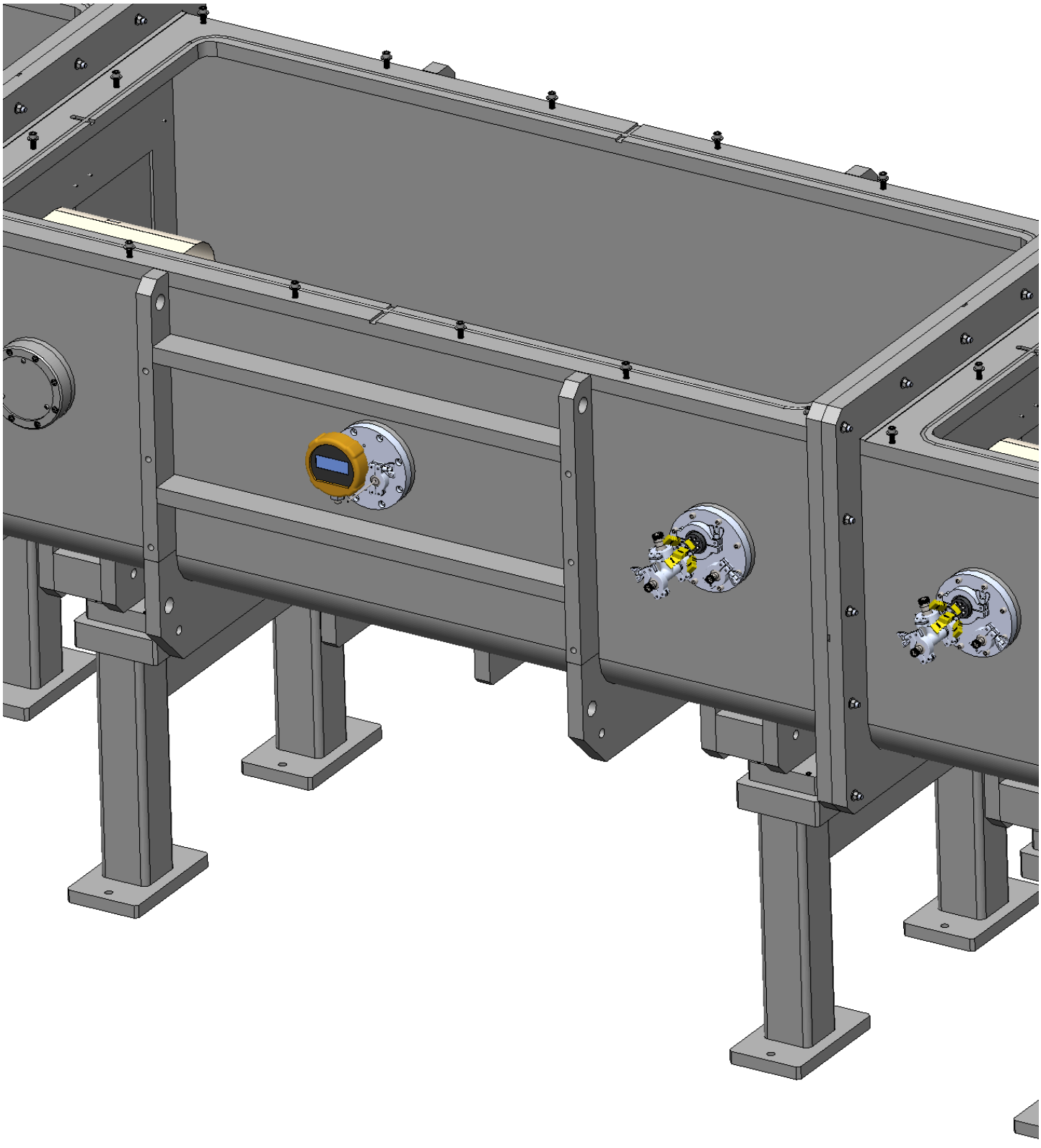
RE: Picture of pressure gauge

From Ramsey, John Clinton <ramseyjc@ornl.gov>
Date Tue 2/24/2026 4:58 PM
To Vavra, Shaun <svavra2@vols.utk.edu>
Cc Kamyshkov, Yuri <kamyshko@utk.edu>

Thanks.

BTW – Based on our conversation earlier, I fixed the position of the upstream wire feedthrough and added a version of the gas feedthrough flange assembly without the gauge and tacked it onto collimator chamber 8. Let me know if you see anything amiss!

John



From: Vavra, Shaun <svavra2@vols.utk.edu>
Sent: Tuesday, February 24, 2026 1:46 PM
To: Ramsey, John Clinton <ramseyjc@ornl.gov>
Cc: Kamyshkov, Yuri <kamyshko@utk.edu>
Subject: [EXTERNAL] Re: Picture of pressure gauge

Will take some pictures of it and email them to you.

Get Outlook for iOS

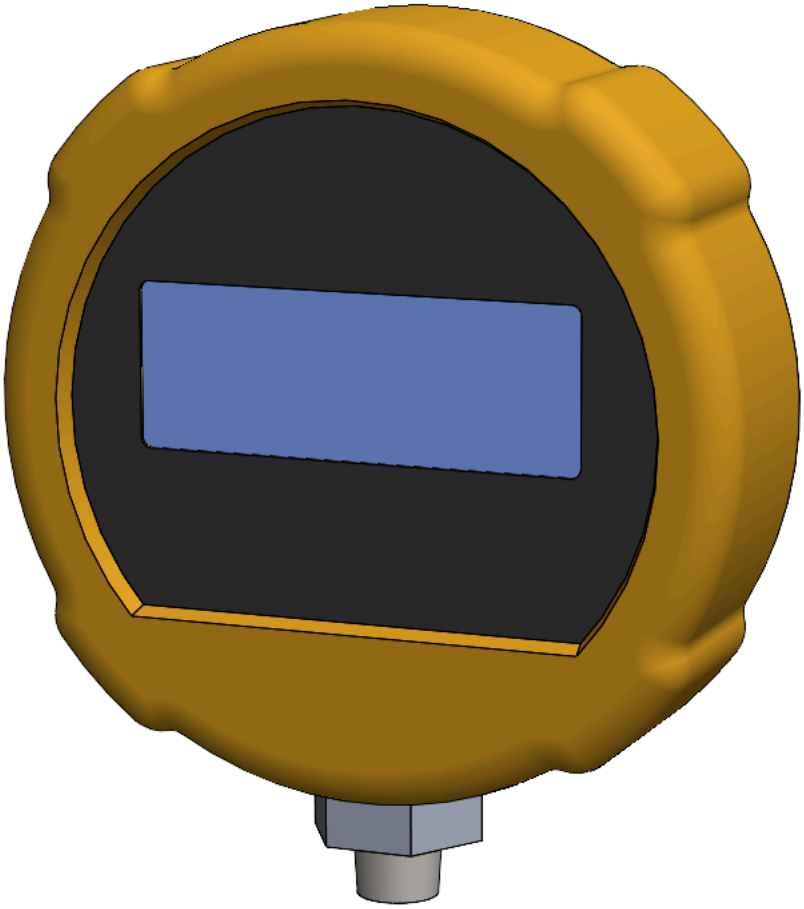
From: Ramsey, John Clinton <ramseyjc@ornl.gov>
Sent: Tuesday, February 24, 2026 1:52:13 PM
To: Vavra, Shaun <svavra2@vols.utk.edu>

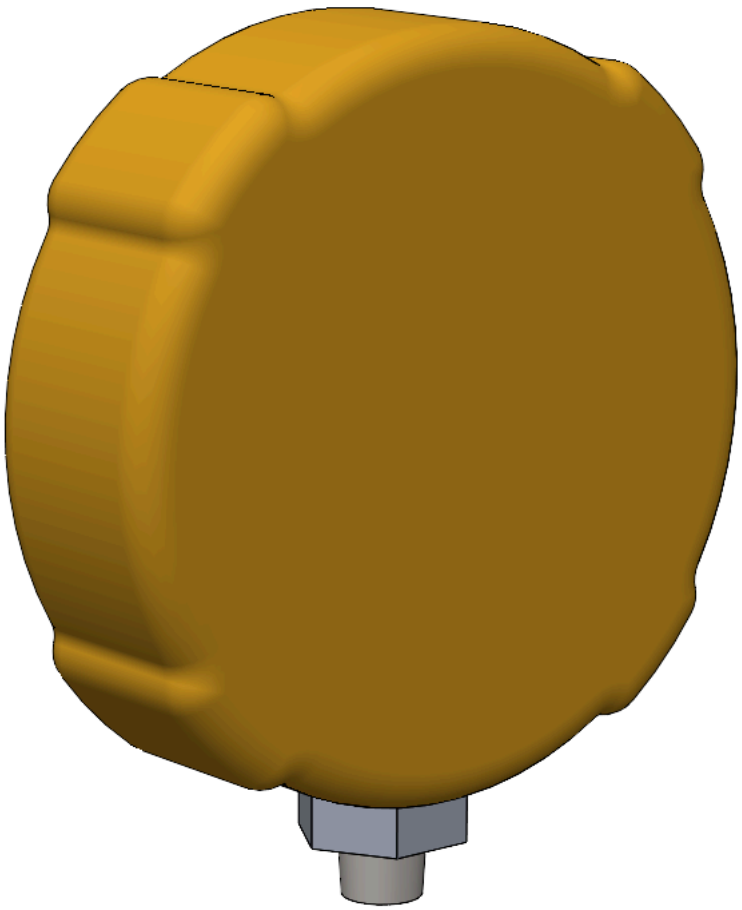
Cc: Kamyshkov, Yuri <kamyshko@utk.edu>
Subject: RE: Picture of pressure gauge

Hi Shaun,

Can you clarify a couple things for me here? I haven't seen a side housing or knob in the pics that I've got. Could you send me a couple of photographs to clarify this? I've already integrated the improved case OD and the hex on the base into my model. Here is a couple of screen shots of the current model.

Thanks!
John





From: Vavra, Shaun <svavra2@vols.utk.edu>
Sent: Tuesday, February 24, 2026 10:22 AM
To: Ramsey, John Clinton <ramseyjc@ornl.gov>
Cc: Kamyshkov, Yuri <kamyshko@utk.edu>
Subject: [EXTERNAL] RE: Picture of pressure gauge

These measurements are in inches per Josh.
Yellow Case OD: is 4.875 in
Side Housing: 1.812 in
There is a black knob in the back that sticks out .35
The base is a 15/16 Hex

From: Ramsey, John Clinton <ramseyjc@ornl.gov>
Sent: Tuesday, February 24, 2026 11:02 AM
To: Vavra, Shaun <svavra2@vols.utk.edu>
Cc: Kamyshkov, Yuri <kamyshko@utk.edu>
Subject: RE: Picture of pressure gauge

Perfect. Thank you!
John

From: Vavra, Shaun <svavra2@vols.utk.edu>
Sent: Tuesday, February 24, 2026 8:57 AM
To: Ramsey, John Clinton <ramseyjc@ornl.gov>
Cc: Kamyshkov, Yuri <kamyshko@utk.edu>
Subject: [EXTERNAL] RE: Picture of pressure gauge

I should be able to do that for you. I will get the tool from the shop.

From: Ramsey, John Clinton <ramseyjc@ornl.gov>
Sent: Tuesday, February 24, 2026 10:56 AM
To: Kamyshkov, Yuri <kamyshko@utk.edu>

Cc: Vavra, Shaun <svavra2@vols.utk.edu>
Subject: RE: Picture of pressure gauge

Hi Yuri,

I need some dimensions taken with a set of calipers. To try to keep things simple, can someone please take measurements of the OD and thickness of the gauge housing (the yellow part)? I also need the dimensions of the metal boss for the NPT connection.

If I have accurate representations of those, I believe that I can make a two-piece 3D-printed assembly that will hold it nicely in position.

Thanks,
John

From: Kamyshkov, Yuri <kamyshko@utk.edu>
Sent: Tuesday, February 24, 2026 7:55 AM
To: Ramsey, John Clinton <ramseyjc@ornl.gov>
Cc: Vavra, Shaun <svavra2@vols.utk.edu>
Subject: [EXTERNAL] Picture of pressure gauge

John,
pls see attached picture.
If some measurements needed, please, guide us.
Best,
Yuri

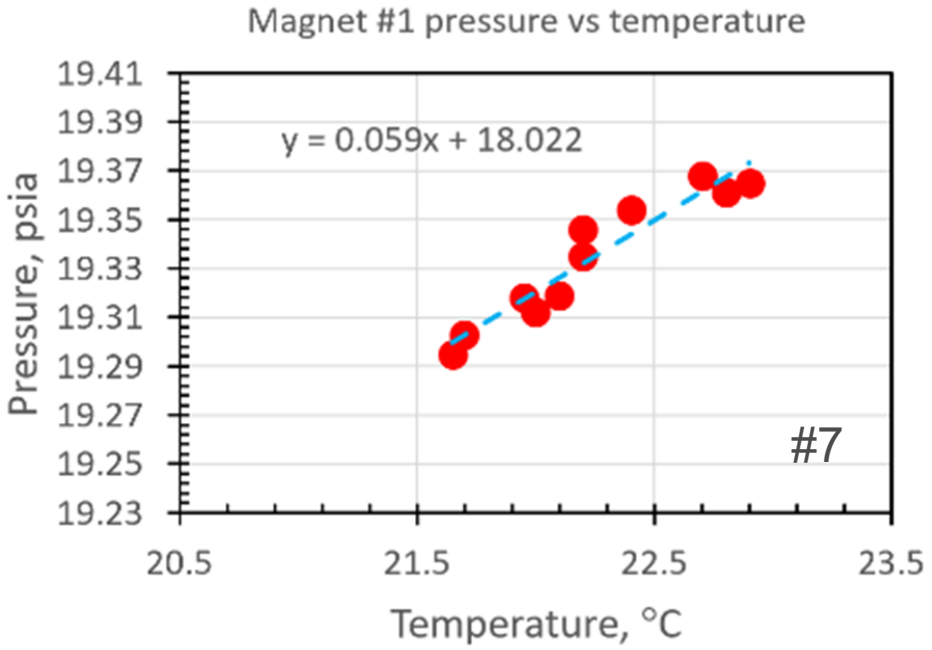
Pressure Measurements

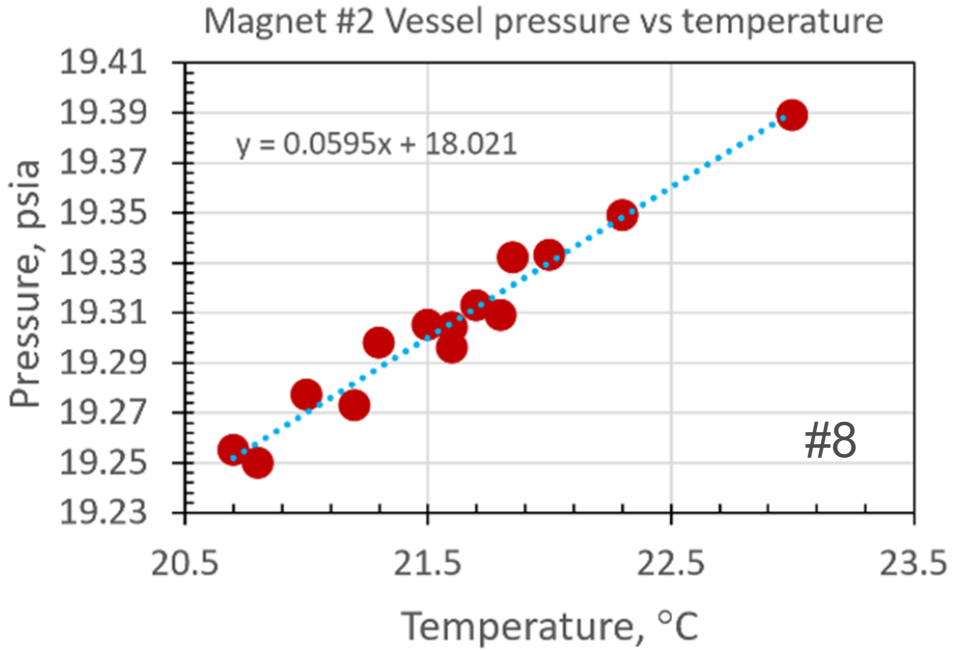
By Shaun Vavra

Absolute Pressure	Date	Mag 1 PSI	Mag 2 PSI	HFIR	Temp
Y	6-Nov	19.374	18.877	Y	
Y	16-Feb	19.2	18.635	Y	
Y	17-Feb	19.305	18.724	N	
Y	23-Feb	19.287	18.706	N	21.5 C
Y	24-Feb	19.292	18.712	N	21.6 C

Mag 1 varies only from 19.200 → 19.374 PSI
Mag 2 varies only from 18.635 → 18.877 PSI

Red points:
October 2024 – February 2025 before nTMM





■ Green points measured Nov-06-2025 after nTMM

■ Blue points measured February 23-24 2026