# Agenda of the meeting today:

1. Lisa - New start date for neutron beam
2. Yuri - GP-SANS visit on July 28-th for Linus, Mubi, and Evan
3. Discussion of the recent dry run (Yuri) and neutron threshold measurements (Lisa and Matt)
4. Mubi - COMSOL simulations and the prototype at the UKY
5. Linus – Optical Potential recheck and COMSOL simulations at LU
6. John, Yuri - Construction of the mu-metal shielding prototype at the UTK

# New HFIR Beam Start Date is August 26

How reliable is that now?

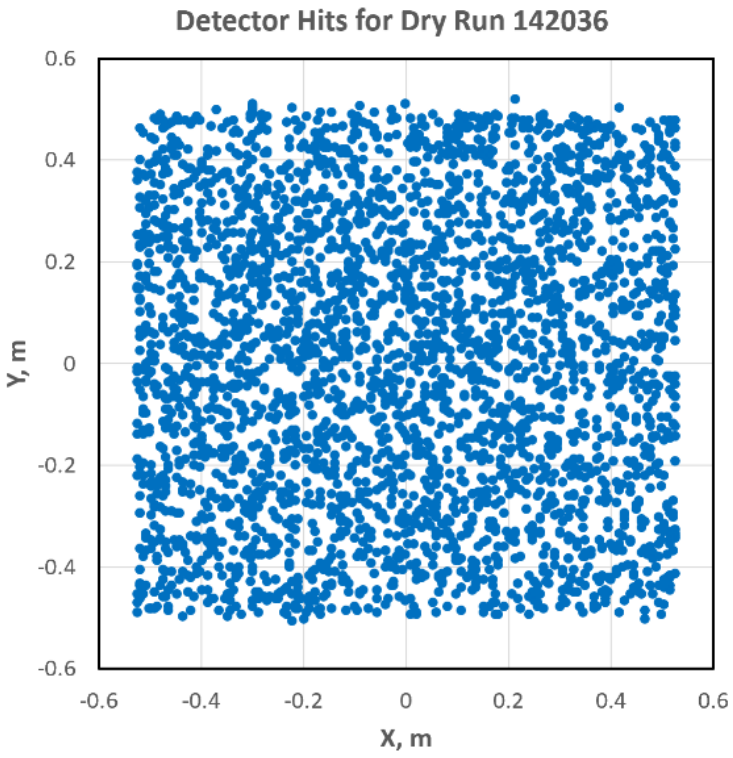
Meeting of Linus, Mubi, Evan
with Lisa, Arina, Yuri, Shaun

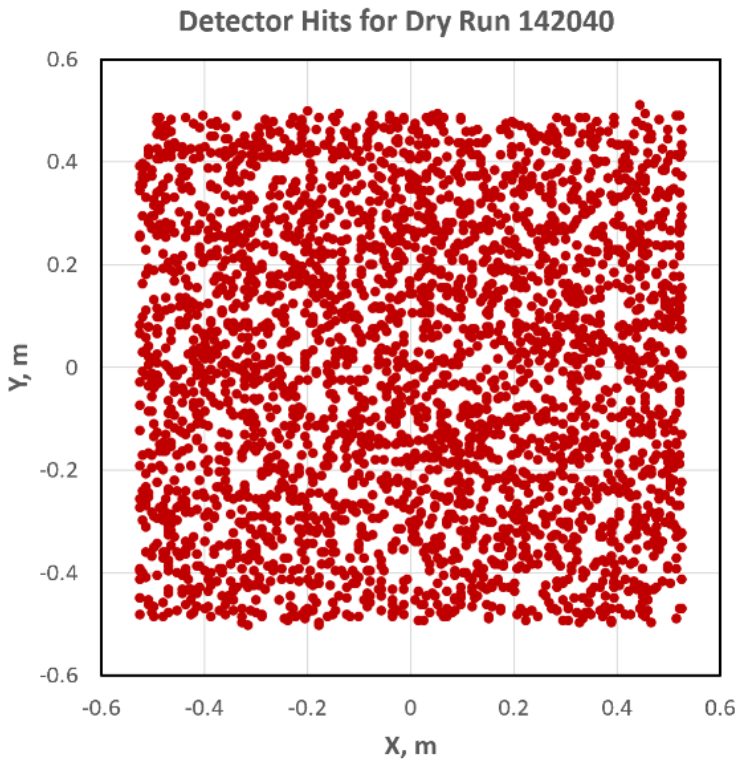
on Monday July 28

Linus and Mubi might take on-site training on this day
Evan has all training accomplished

# Dry Run on July 9-10 without neutrons

- data of 65 runs of 30’ duration with ~ 3000 background events in GP-SANS detector



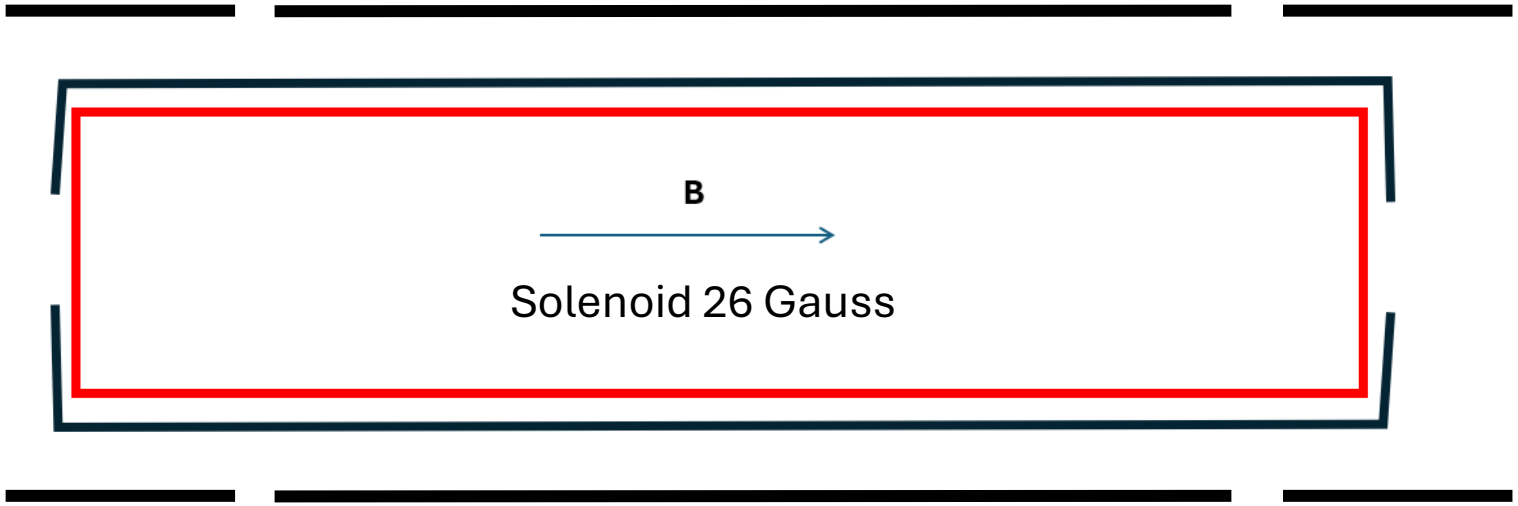



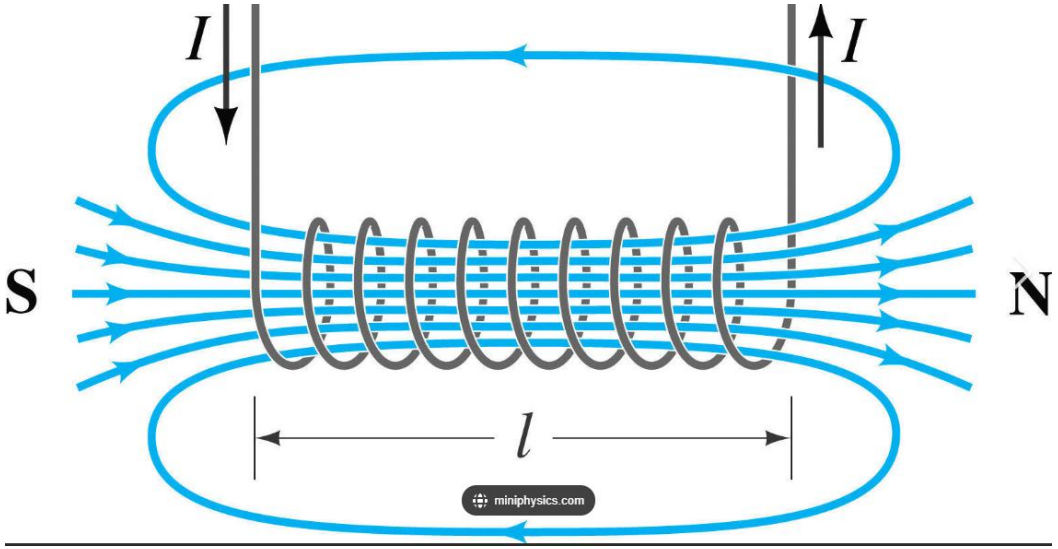

At 2 m from the sample position detector counting rate is ~1.8 cps

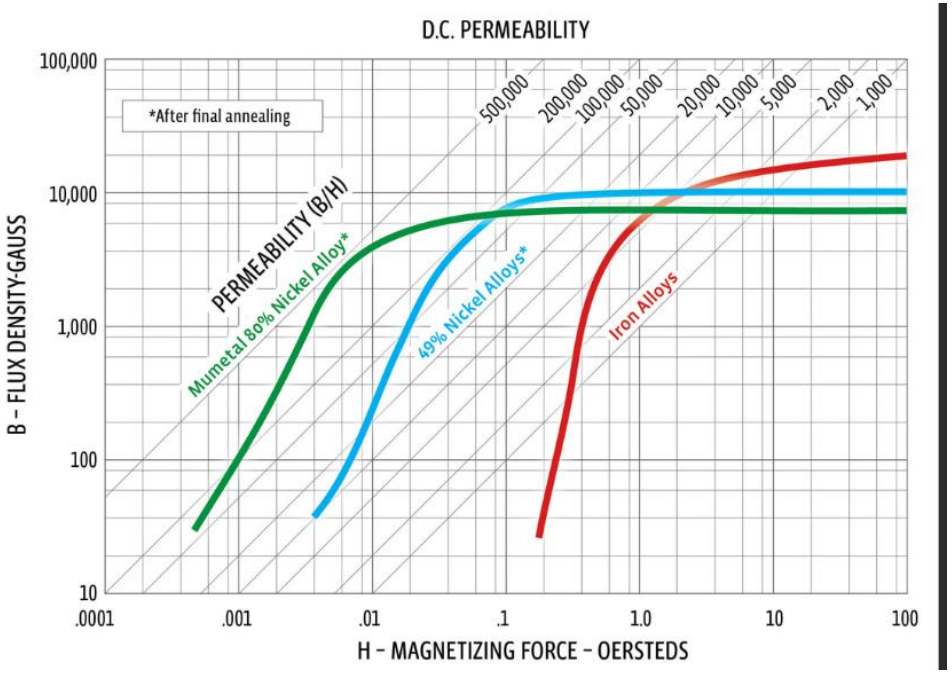
- Two power supplies, thermocouples, magnetometers – all were connected to DAQ, but corresponding information did not appear in DATA files
- Matt Frost’s NEXUS *.h5 converter to ASCII format is working

# Our two installed magnets (schematically)

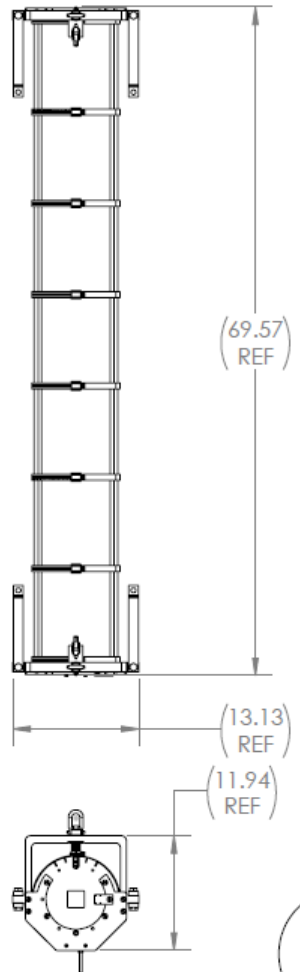


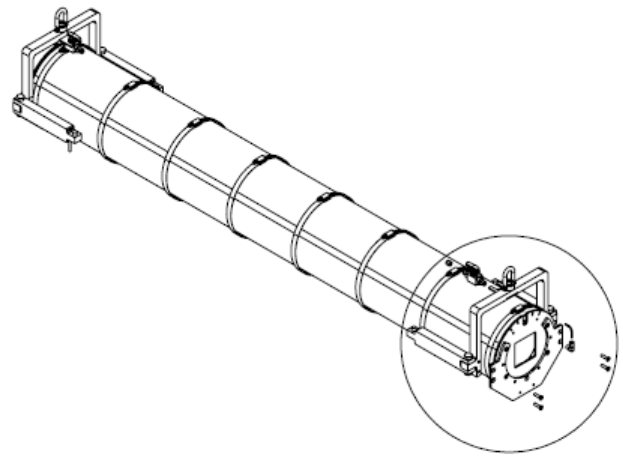


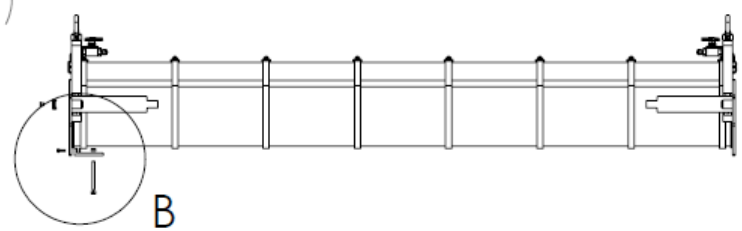



| REVISIONS | | | |
|---|---|---|---|
| REV. | DESCRIPTION | DATE | APPROVED |
| 01 | ADDED MAGNETOMETER ASSEMBLY | 4/23/2025 | John C. Ramsey Digitally signed by John C. Ramsey Date: 2025.04.23 12:42:26 -06'00' |

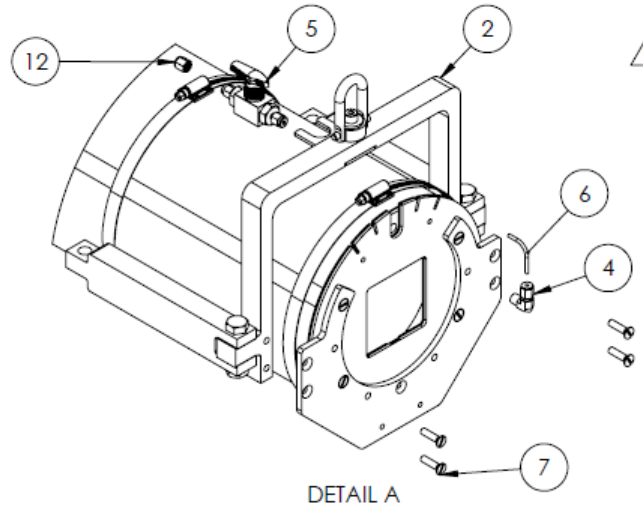


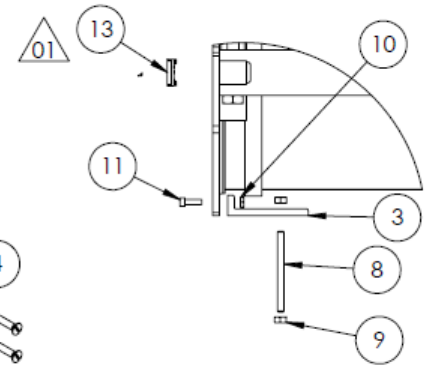
A



B




DETAIL A
SCALE 1 : 5




DETAIL B
SCALE 1 : 5

| ITEM NO. | PARTNO | DESCRIPTION | QTY. |
|---|---|---|---|
| 1 | NB5-M-70-U-0035-R00 | NTMM MAGNET | 1 |
| 2 | NB5-M-70-U-0007-R00 | NTMM YOKE ASSEMBLY | 2 |
| 3 | NB5-M-70-U-0013-R00 | SEISMIC TETHER MOUNT | 1 |
| 4 | 5272K303 (MCMASTER OR EQUIVALENT) | YOR-LOK FITTING FOR COPPER TUBING, 90 DEGREE ELBOW ADAPTER FOR 1/8" TUBE X 1/8 NPT MALE | 2 |
| 5 | 4566K11 (MCMASTER OR EQUIVALENT) | BRASS VALVE WITH YOR-LOK FITTINGS, ON/OFF FUNCTION, PANEL-MOUNT, FOR 1/8" TUBE OD | 2 |
| 6 | 8965K224 (MCMASTER OR EQUIVALENT) | SUPER-CONDUCTIVE 101 COPPER, 0.032" THICK TUBE WALL, 1/8" OD | 2 |
| 7 | 99468A195 (MCMASTER OR EQUIVALENT) | ALUMINUM SLOTTED FLAT HEAD SCREWS, 1/4"-20 THREAD SIZE, 1" LONG - MODIFIED TO HAVE A 1/16" INCH CENTRAL VENTING HOLE | 8 |
| 8 | 93225A305 (MCMASTER OR EQUIVALENT) | ALUMINUM THREADED ROD 1/4"-20 THREAD SIZE, 3-1/2" LONG | 1 |
| 9 | 1/4-20 ALUMINUM HEX NUT, MCMASTER-CARR 90670A029 EQUIVALENT | 6061 ALUMINUM HEX NUT 1/4"-20 THREAD SIZE | 2 |
| 10 | 93181A011 (MCMASTER OR EQUIVALENT) | ALUMINUM HEX NUT 10-24 THREAD SIZE | 2 |
| 11 | 98511A717 (MCMASTER OR EQUIVALENT) | ALUMINUM SOCKET HEAD SCREW, 10-24 THREAD SIZE, 5/8" LONG | 2 |
| 12 | 5182K681 (MCMASTER OR EQUIVALENT) | CAP FOR 1/8" TUBE OD YOR-LOK FITTING | 2 |
| 13 | NB5-M-70-U-0047-R00 | MAGNETOMETER ASSEMBLY | 1 |

NOTES:

1. YOR LOK CAP (ITEM 12) TO BE ADDED AFTER VESSEL IS CHARGED TO THE REQUIRED PRESSURE
2. HANDLE TO BE REMOVED FROM VALVE (ITEM 5) AFTER VESSEL IS CHARGED TO REQUIRED PRESSURE

PHYSICS DIVISION

OAK RIDGE NATIONAL LABORATORY
OAK RIDGE, TN 37831

DIMENSIONS ARE IN INCHES
TOLERANCES UNLESS SPECIFIED:
ANGULAR: ±0° 30'
TWO PLACE DECIMAL ± 0.01
THREE PLACE DECIMAL ± 0.003
SURFACE FINISH: 128 MICRO-INCH MAX ALL MACHINED SURFACES
BREAK ALL SHARP EDGES

MATERIAL
SEE BOM

NEXT ASSEMBLY
NB5-M-70-U-0001-R00

| | NAME | DATE |
|---|---|---|
| DRAWN | WALLACE | 10/24/2024 |
| CHECKED | SABENS | 10/25/2024 |
| APPROVED | KAMYSHKOV | 10/24/2024 |
| REVIEWED | SCHMITT | 11/1/2024 |

COMMENTS:

nTMM@HFIR

NB5-M-70-U-0002-R01 (nTMM DISMOUNTABLE ASM)

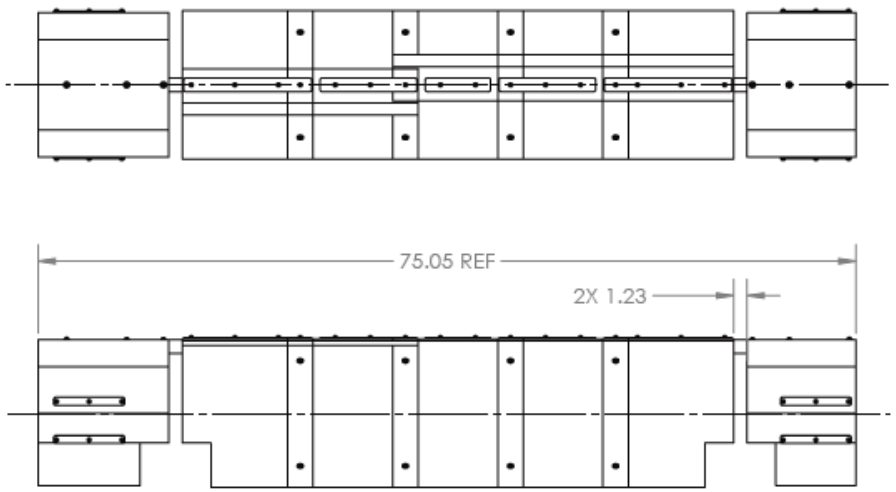
| SIZE | DWG. NO. | REV. |
|---|---|---|
| B | NB5-M-70-U-0002-R01 | 01 |

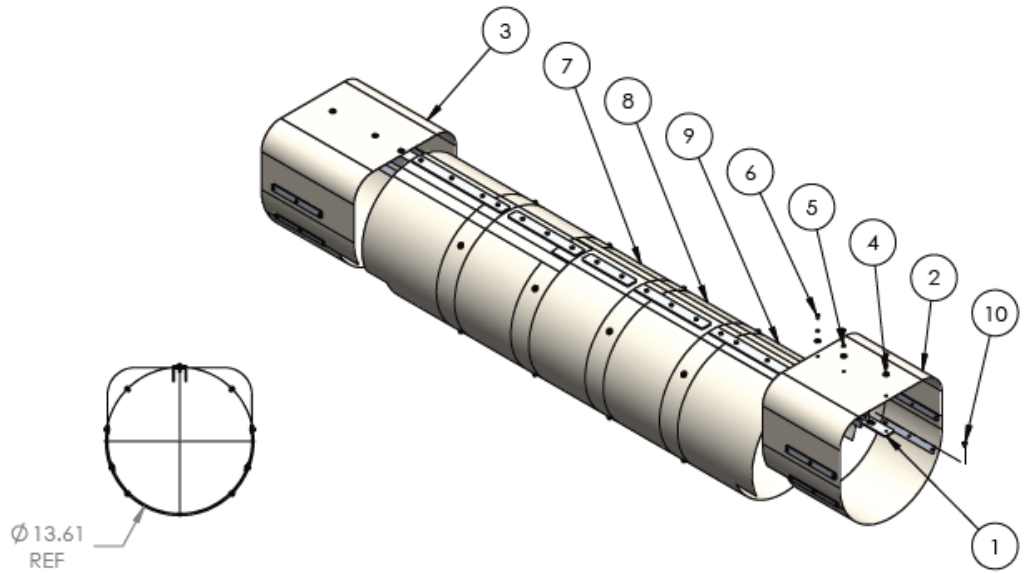
SCALE:1:14 | WEIGHT: ~180 lb. | SHEET 1 OF 1

Magnets installed  May 23

New shielding designed June 9

| ITEM NO. | FILE NAME | DESCRIPTION | SW-CONFIGURATION NAME(CONFIGURATION NAME) | QTY. |
|---|---|---|---|---|
| 1 | NB5-M-70-U-0070-R00 (NTMM MU-METAL SHIELD SUPPORT SPINE) | NB5-M-70-U-0070-R00 | DEFAULT | 1 |
| 2 | NB5-M-70-U-0071-R00 (NTMM MU-METAL ASSEMBLY_OUTBOARD) | NB5-M-70-U-0071-R00 | NARROW | 1 |
| 3 | NB5-M-70-U-0071-R00 (NTMM MU-METAL ASSEMBLY_OUTBOARD) | NB5-M-70-U-0071-R00 | WIDE | 1 |
| 4 | 90474A172_ASME WASHER | #10 ALUMINUM FLAT-WASHER, 9/16 OD, MCMASTER-CARR 90474A172 OR EQUIVALENT | 90474A172 | 6 |
| 5 | 91013A718_ALUMINUM SPLIT LOCK WASHER | #10 ALUMINUM SPLIT LOCK WASHER, MCMASTER-CARR 91013A718 OR EQUIVALENT | 91013A718 | 6 |
| 6 | 93143A842_ALUMINUM DECORATIVE ROUND HEAD SLOTTED SCREWS | 10/32 X 3/8 202F ALUMINUM ROUND HEAD SLOTTED SCREW, MCMASTER-CARR 93143A842 OR EQUIVALENT | 93143A842 | 6 |
| 7 | NB5-M-70-U-0076-R00 (NTMM MU-METAL ASSEMBLY_CENTRAL) | NB5-M-70-U-0076-R00 | ONE-PIECE CENTRAL | 1 |
| 8 | NB5-M-70-U-0076-R00 (NTMM MU-METAL ASSEMBLY_CENTRAL) | NB5-M-70-U-0076-R00 | ONE-PIECE INBOARD | 2 |
| 9 | NB5-M-70-U-0080-R00 (NTMM MU-METAL ASSEMBLY_INBOARD) | NB5-M-70-U-0080-R00 | DEFAULT | 2 |
| 10 | 99468A184_ALUMINUM SLOTTED FLAT HEAD SCREWS | 1/4-20 X 3/8 ALUMINUM SLOTTED FLAT-HEAD SCREW, MCMASTER-CARR 99468A184 OR EQUIVALENT | VENTED | 1 |







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THREE PLACE DECIMAL ± 0.003
SURFACE FINISH: 128 MICRO-INCH MAX ALL MACHINED SURFACES
BREAK ALL SHARP EDGES

MATERIAL
SEE BOM

NEXT ASSEMBLY
NB5-M-70-U-0001-R00

| | NAME | DATE |
|---|---|---|
| DRAWN | John C. Ramsey | |
| CHECKED | Taylor Dodson | |
| APPROVED | Yuri Kamyshkov | |
| REVIEWED | | |

COMMENTS:

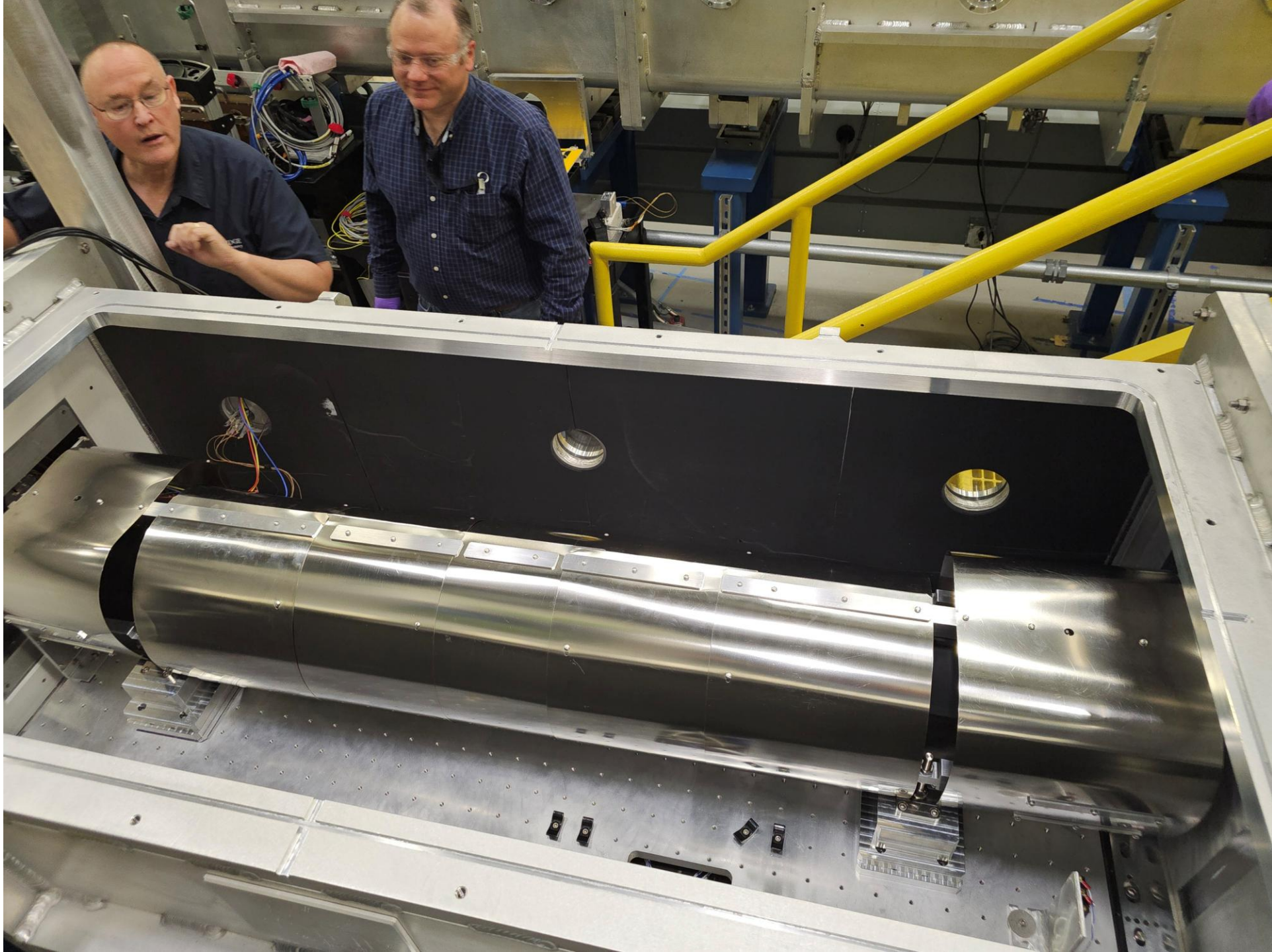
nTMM@HFIR

NB5-M-70-U-0069-R00 (nTMM MU-METAL SHIELD ASSEMBLY)

| SIZE | DWG. NO. | REV. |
|---|---|---|
| B | NB5-M-70-U-0069-R00 | 00 |

SCALE:1:12 WEIGHT: 18.3 LB SHEET 1 OF 1

New shielding installed June13



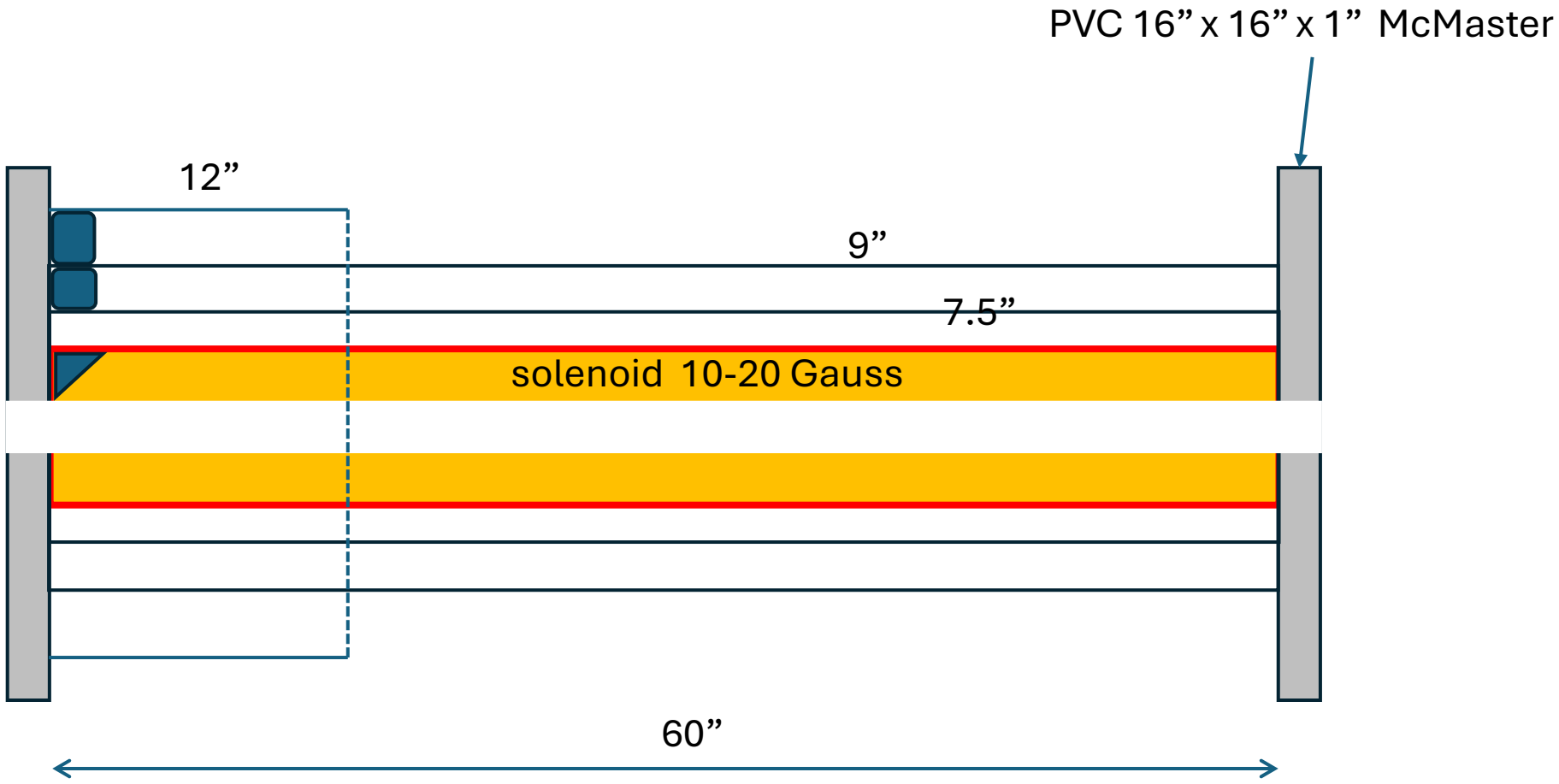
# UT prototype (being constructed) for $\mu$ - metal shielding factor measurement

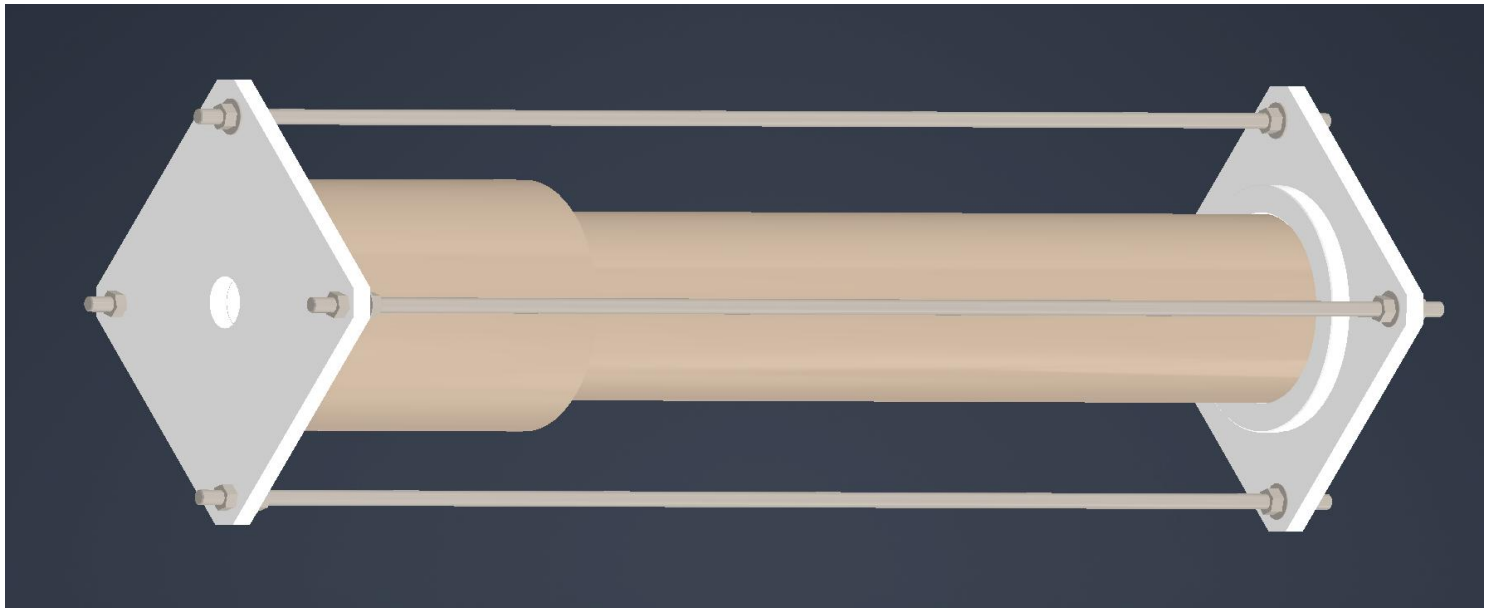
- existing mu-metal

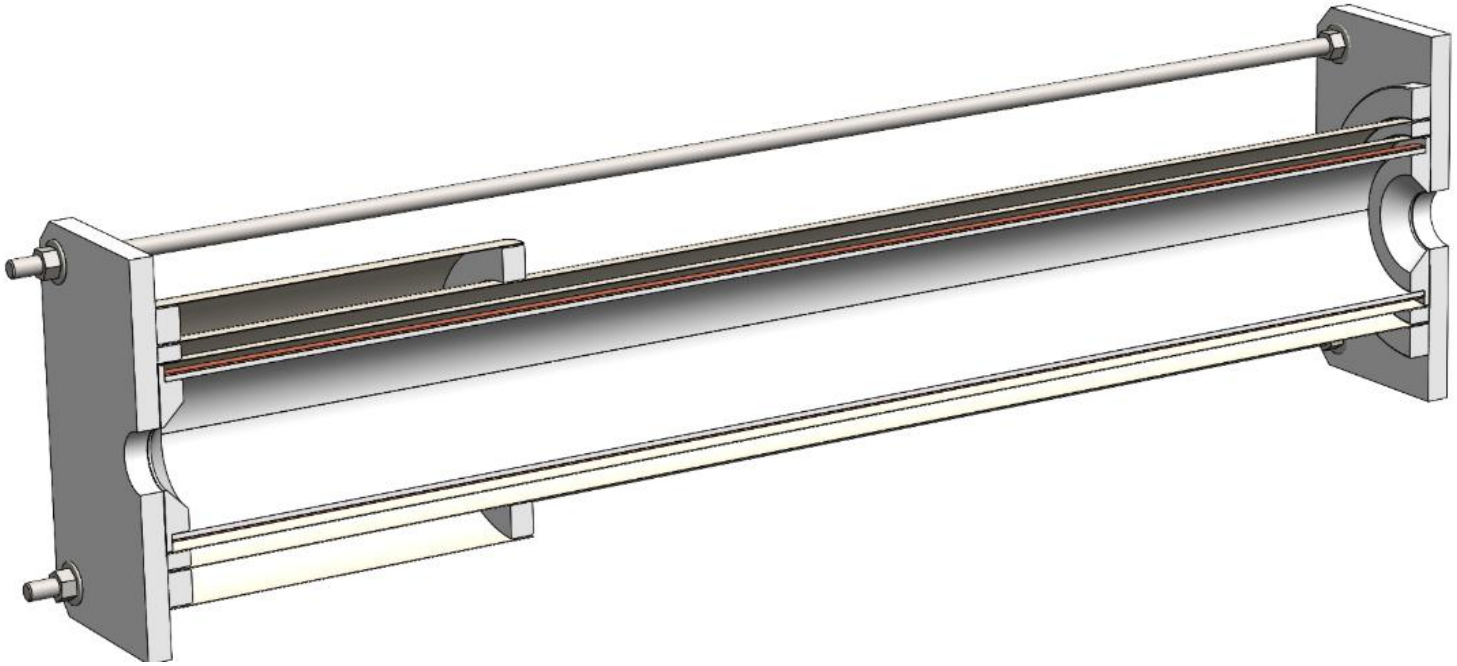
| OD, inches | Length, inches | Wall thick |
|---|---|---|
| 7.5” | 60” | 0.03” = 0.75 mm |
| 9.0” | 60” | 0.03” = 0.75 mm |
| 12” | 16” | 0.03” = 0.75 mm |

- Solenoid inside small diameter $\mu$tube: 6.5” diameter
- 2 layers 18 AWG wires – 5,200’ is needed (4 ×10 lbs spools)
- Central hole ~ 2.5” for Bartington magnetometer insertion
- Supporting plastic construction needed (design + UT shop)
- UT Bartington 3D Magnetometer <10 Gauss can be used
- For higher fields can use existing 3D chip magnetometer (<50 G)

# New prototype







# GOAL:

- compare measured shielding factor with one simulated in COMSOL.
- use the found effective $\mu$ for COMSOL simulation for two nTMM magnets in the magnetic environment measured at GP-SANS
- Reconstruct the total field uniformity in the magnets for nTMM sensitivity