

PAUL SCHERRER INSTITUT

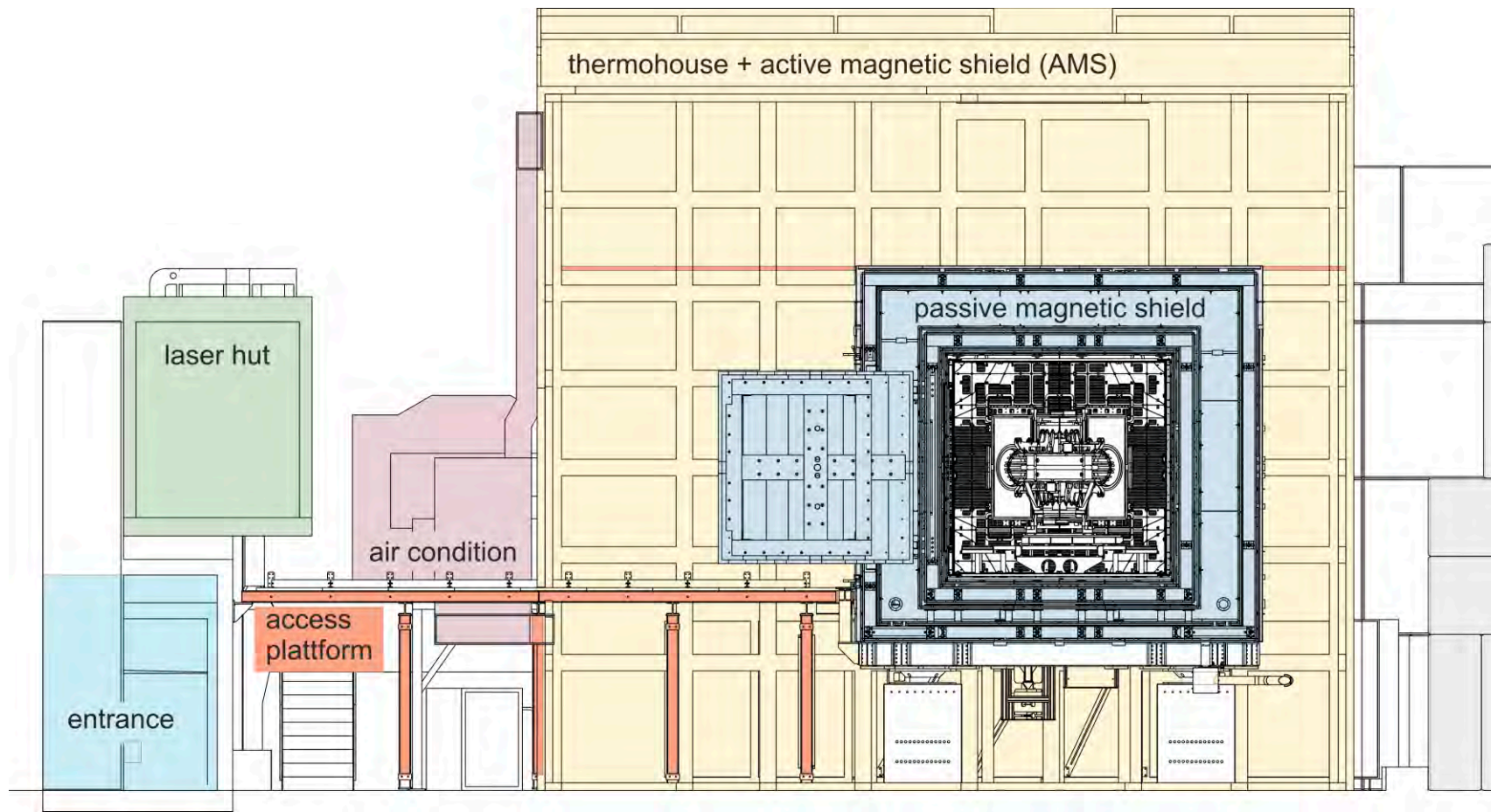


Georg Bison for the nEDM collaboration :: Paul Scherrer Institute

# The n<sup>2</sup>EDM Shield: Specifications & Performance

Int. Workshop on Searches for a Neutron EDM, February 2021



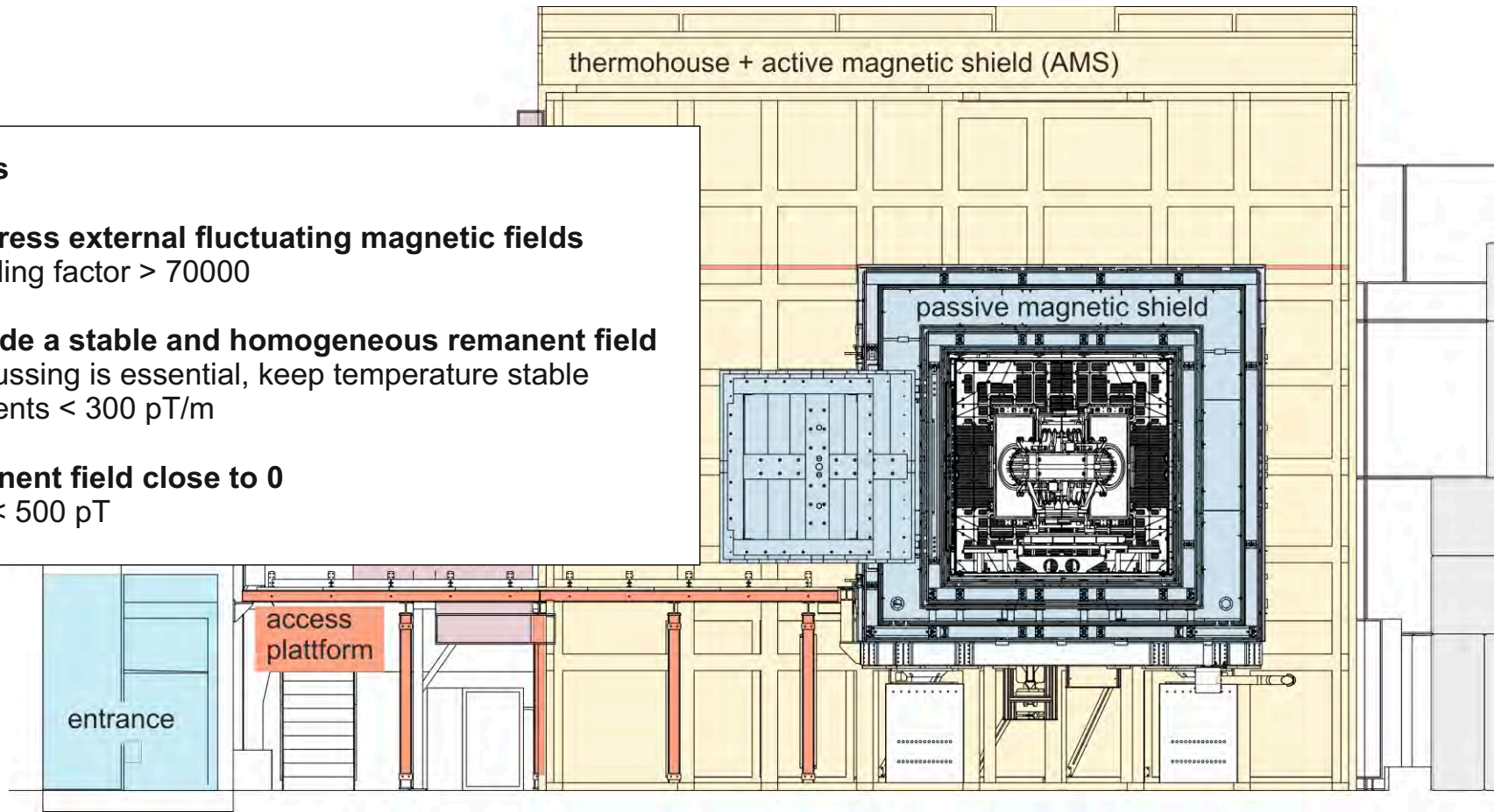


## Goals

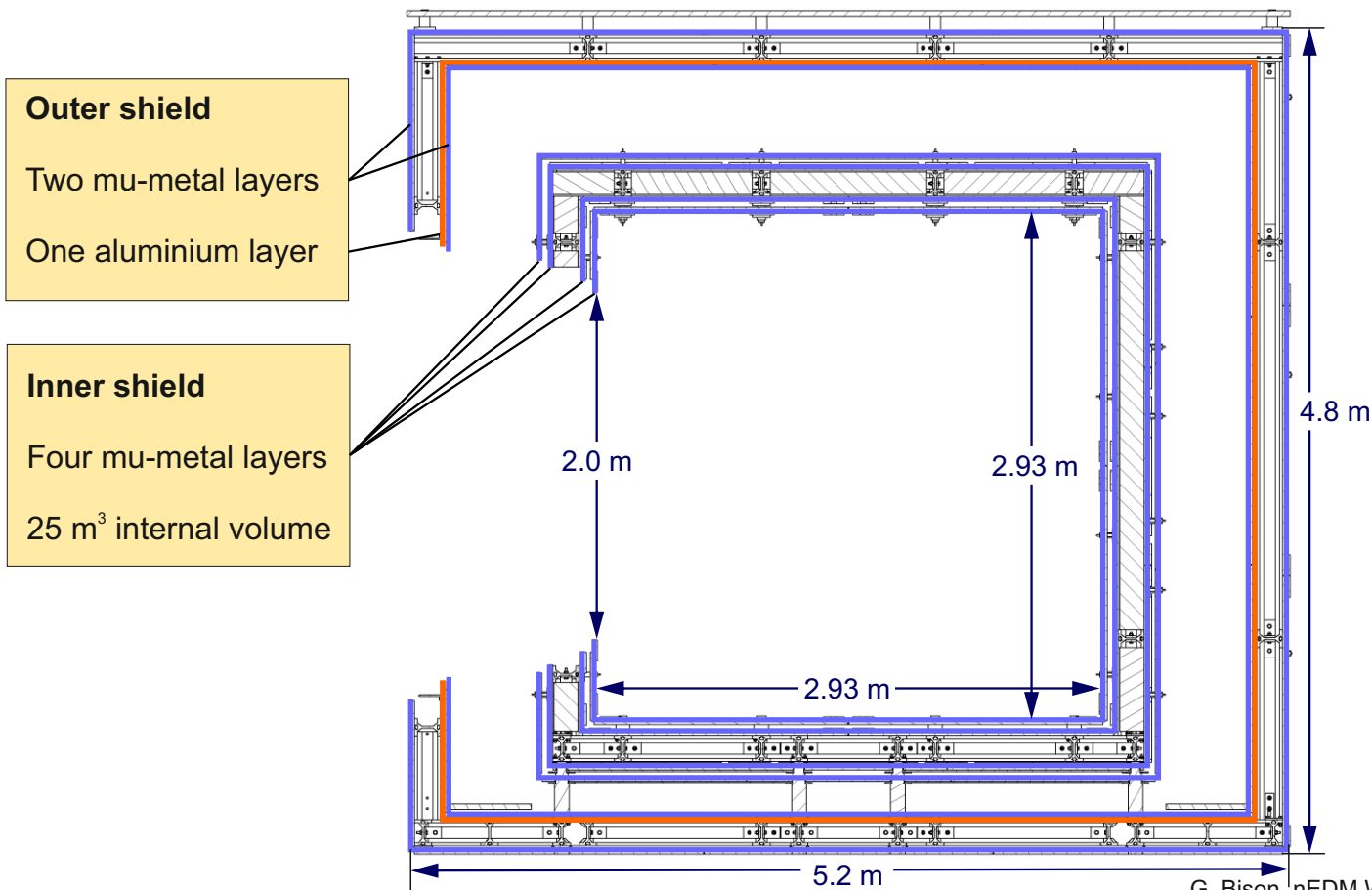
**suppress external fluctuating magnetic fields**  
shielding factor  $> 70000$

**provide a stable and homogeneous remanent field**  
degaussing is essential, keep temperature stable  
gradients  $< 300$  pT/m

**remanent field close to 0**  
field  $< 500$  pT

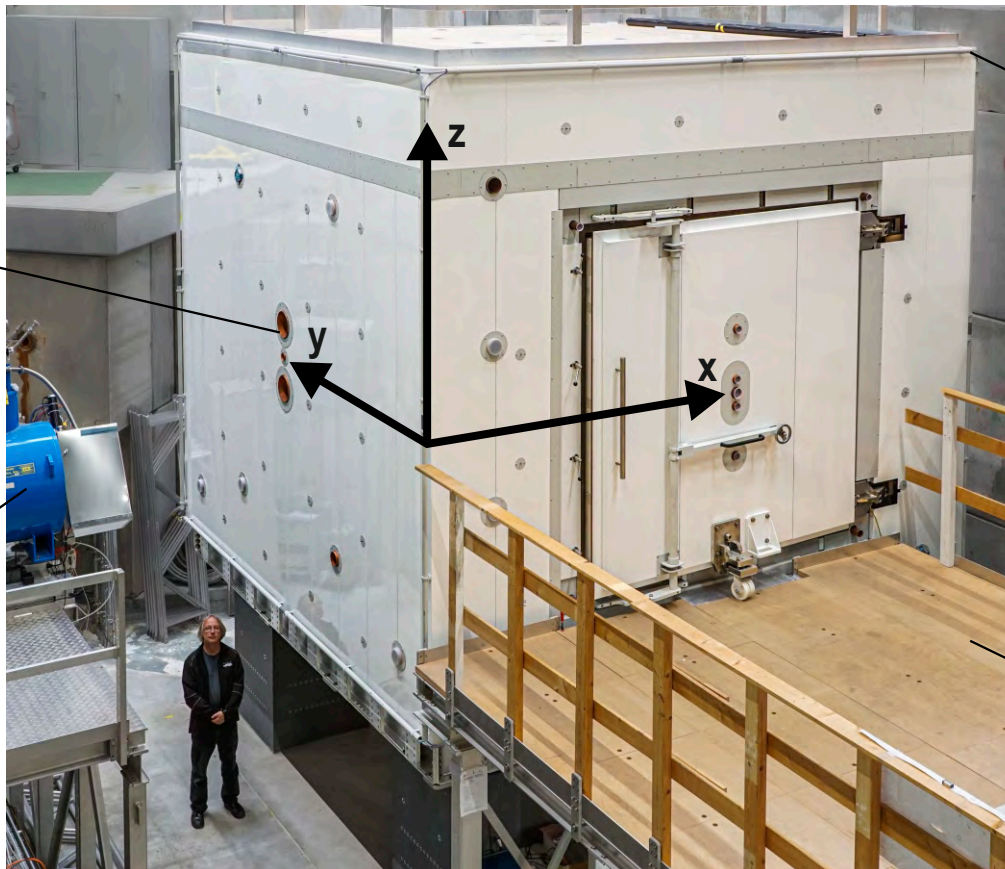


## n2EDM passive magnetic shielding





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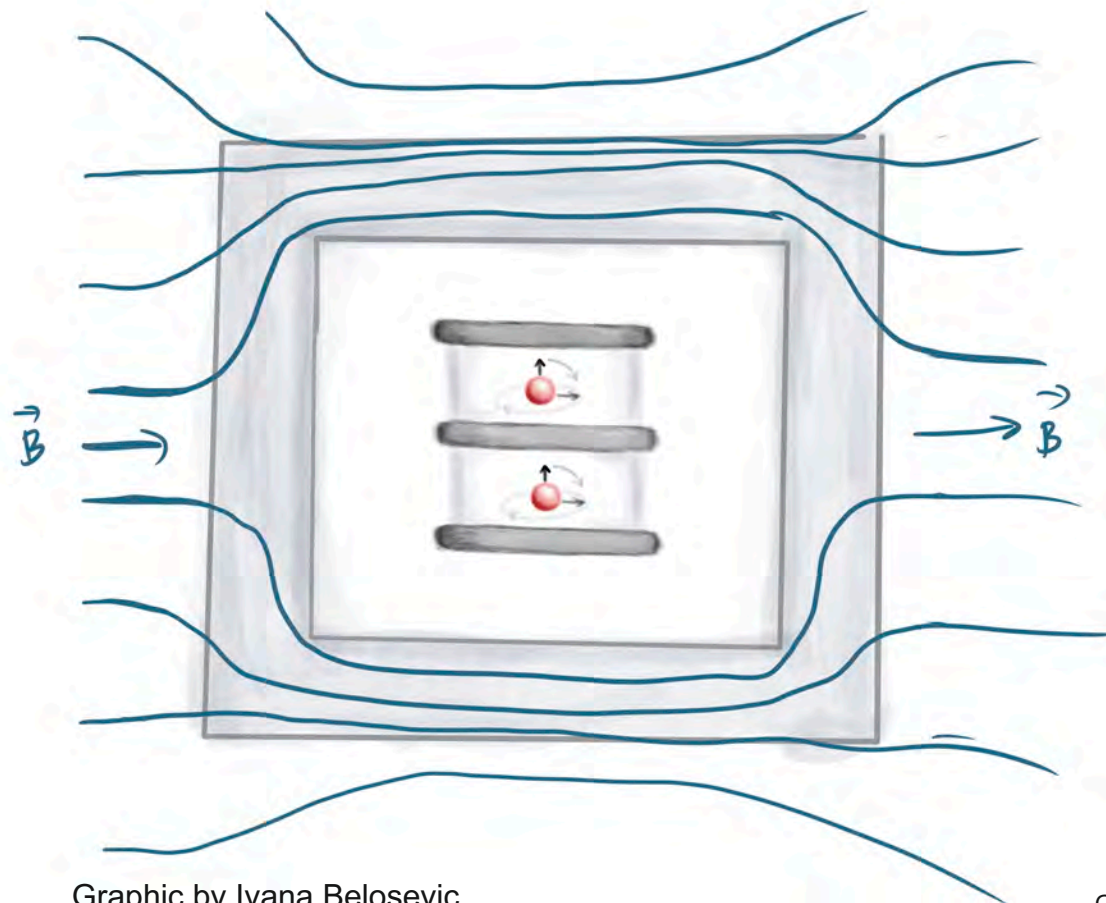
openings (diameter 220 mm)  
for neutron guides

UCN guide with  
superconducting  
polarization magnet

external test coils

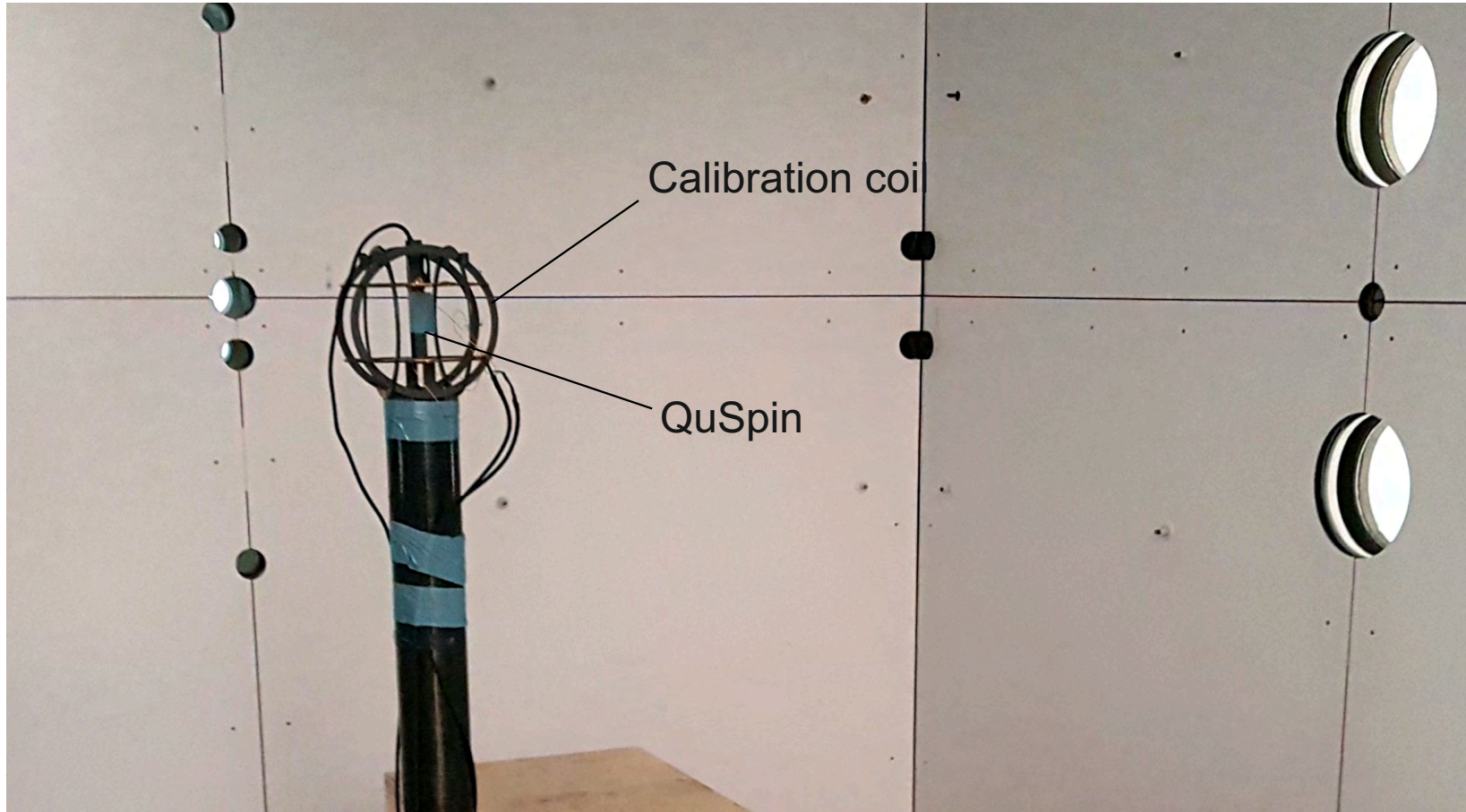
access platform

# Measurement of the shielding factor

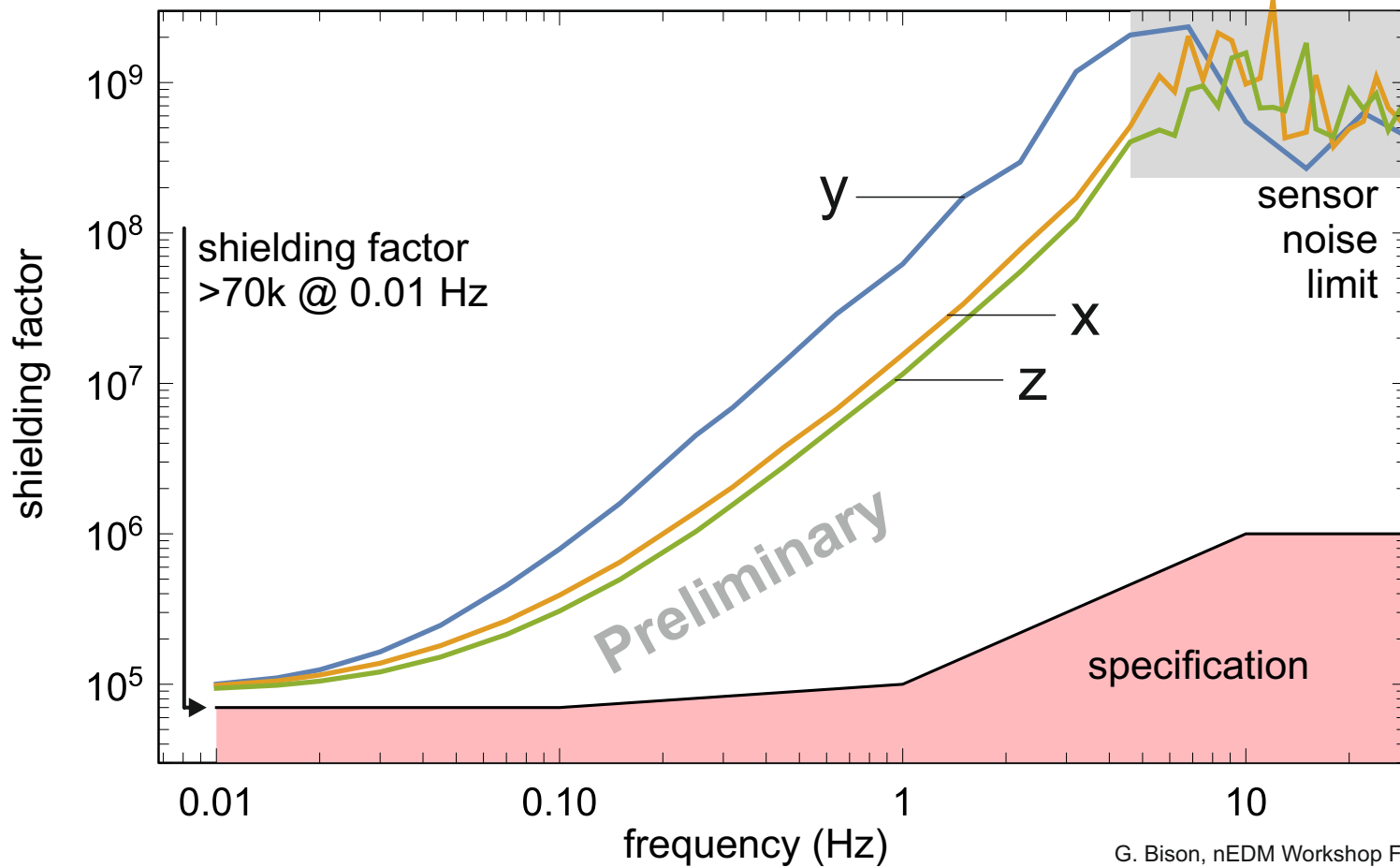


Graphic by Ivana Belosevic

# Measurement of the shielding factor

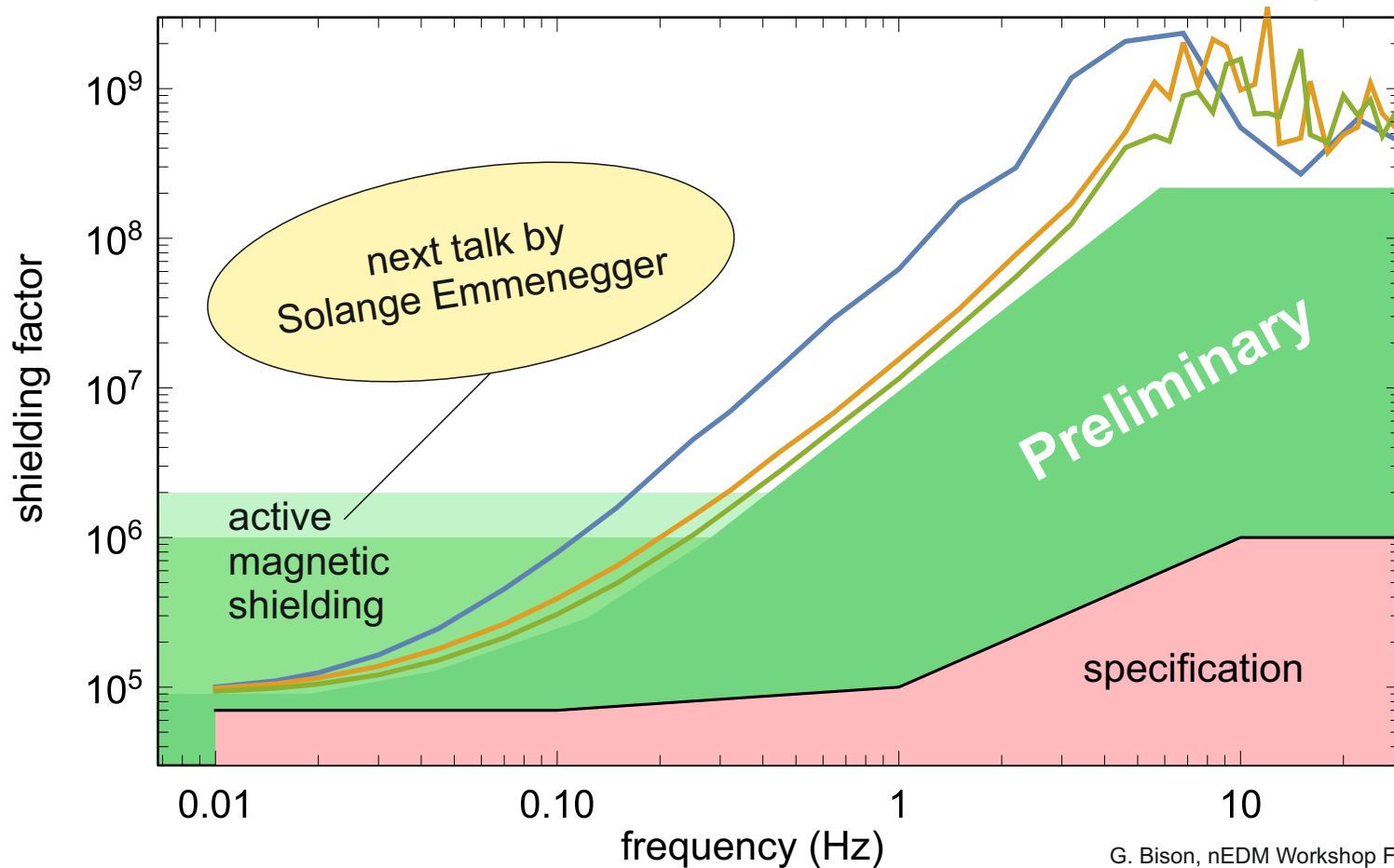


## Measurement of the shielding factor

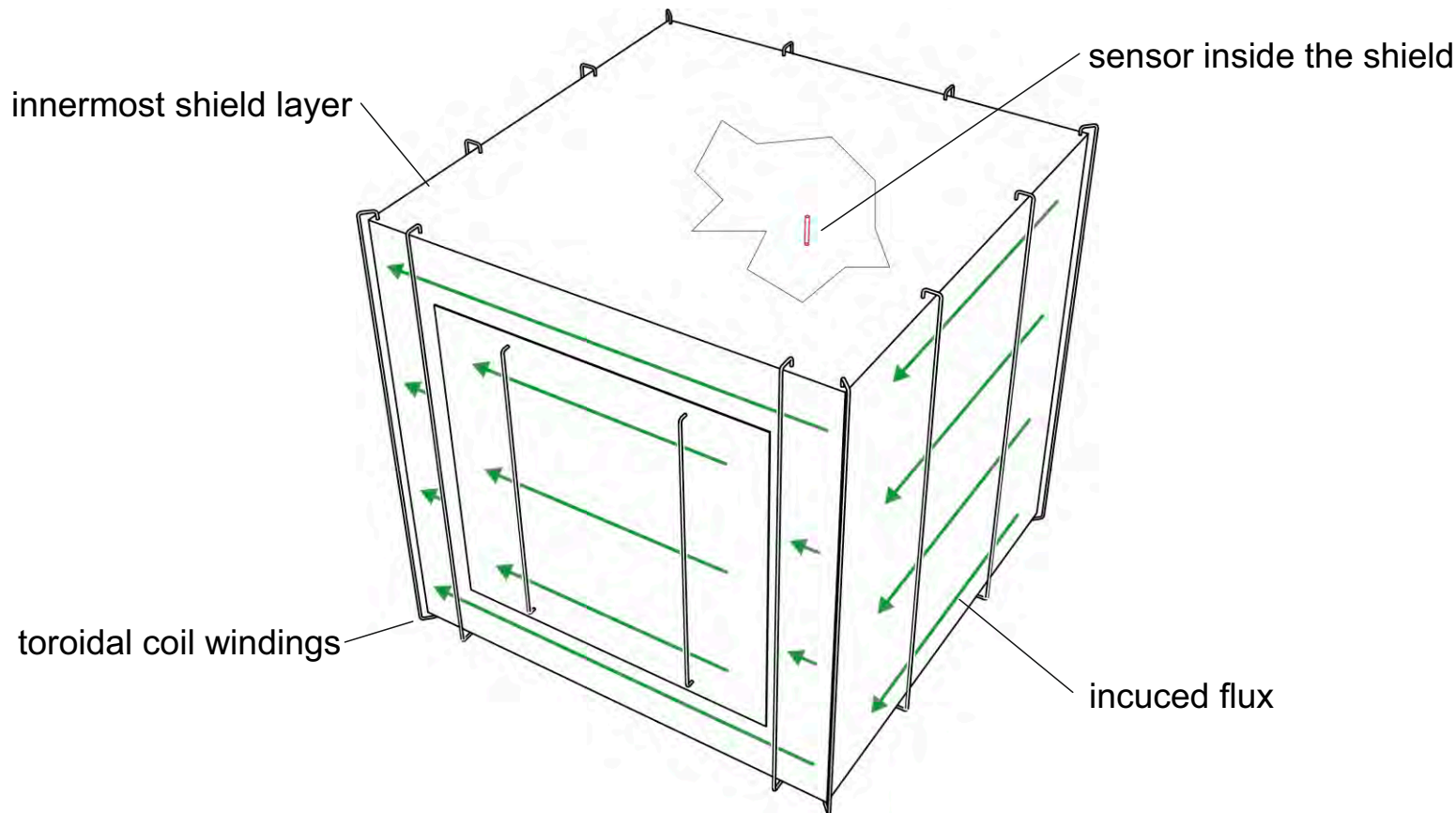




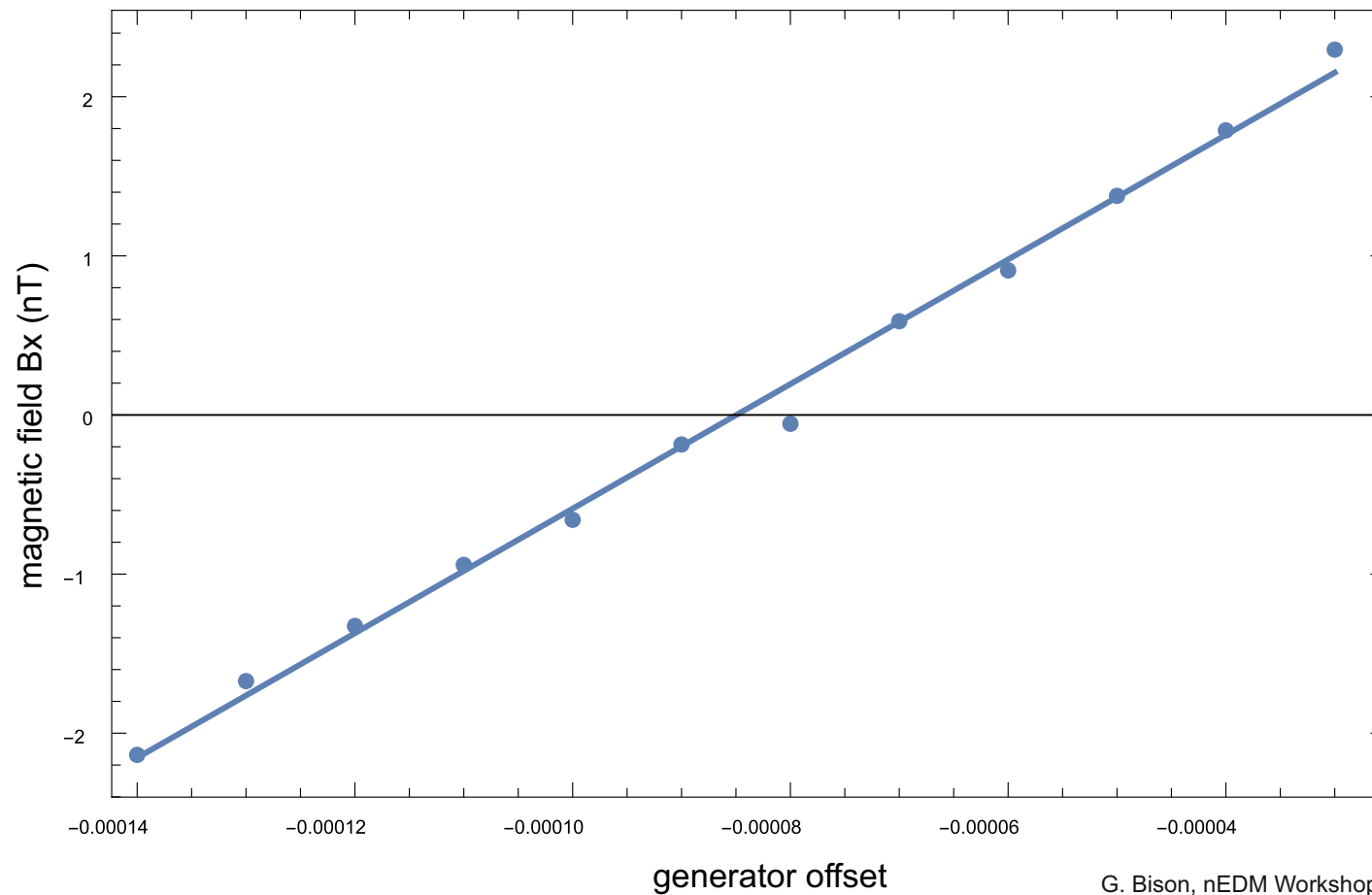
## Measurement of the shielding factor



# Schematic view of degaussing coil “Z”



# Generator offset compensation



## Overview

7 vertical scans (along z)

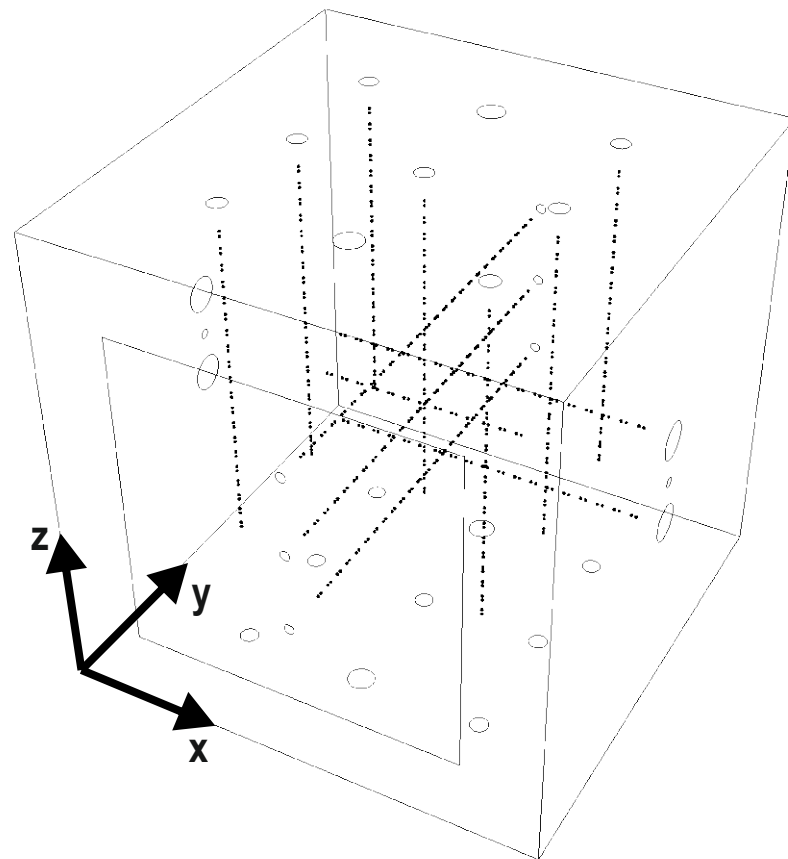
3 horizontal scans (along x)

3 horizontal scans (along y)

measurements taken every 10 cm

reproducibility better 30 pT

in total more than 1000 data points

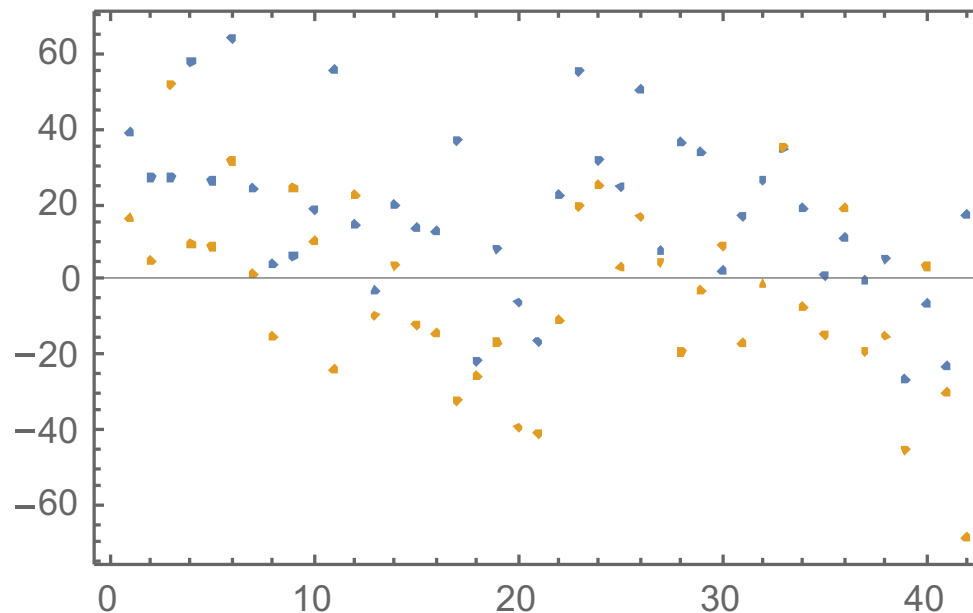


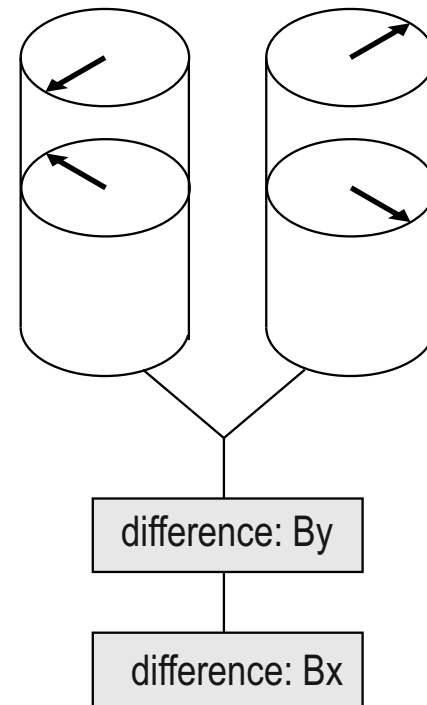
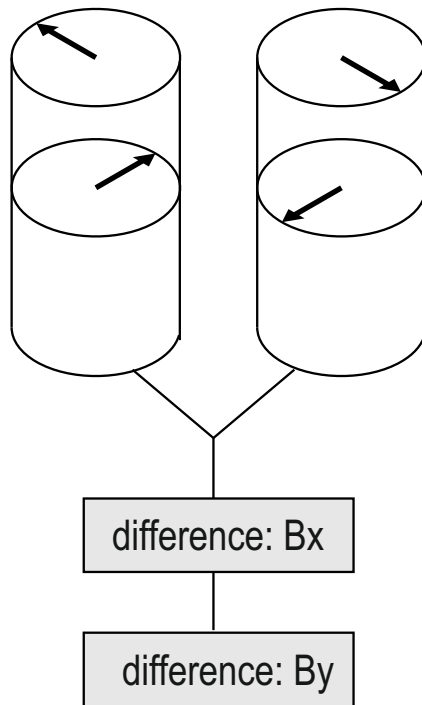
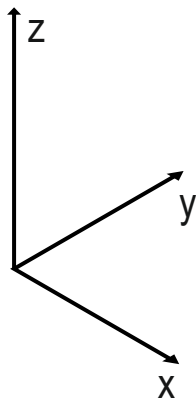


# Remanent field measurements

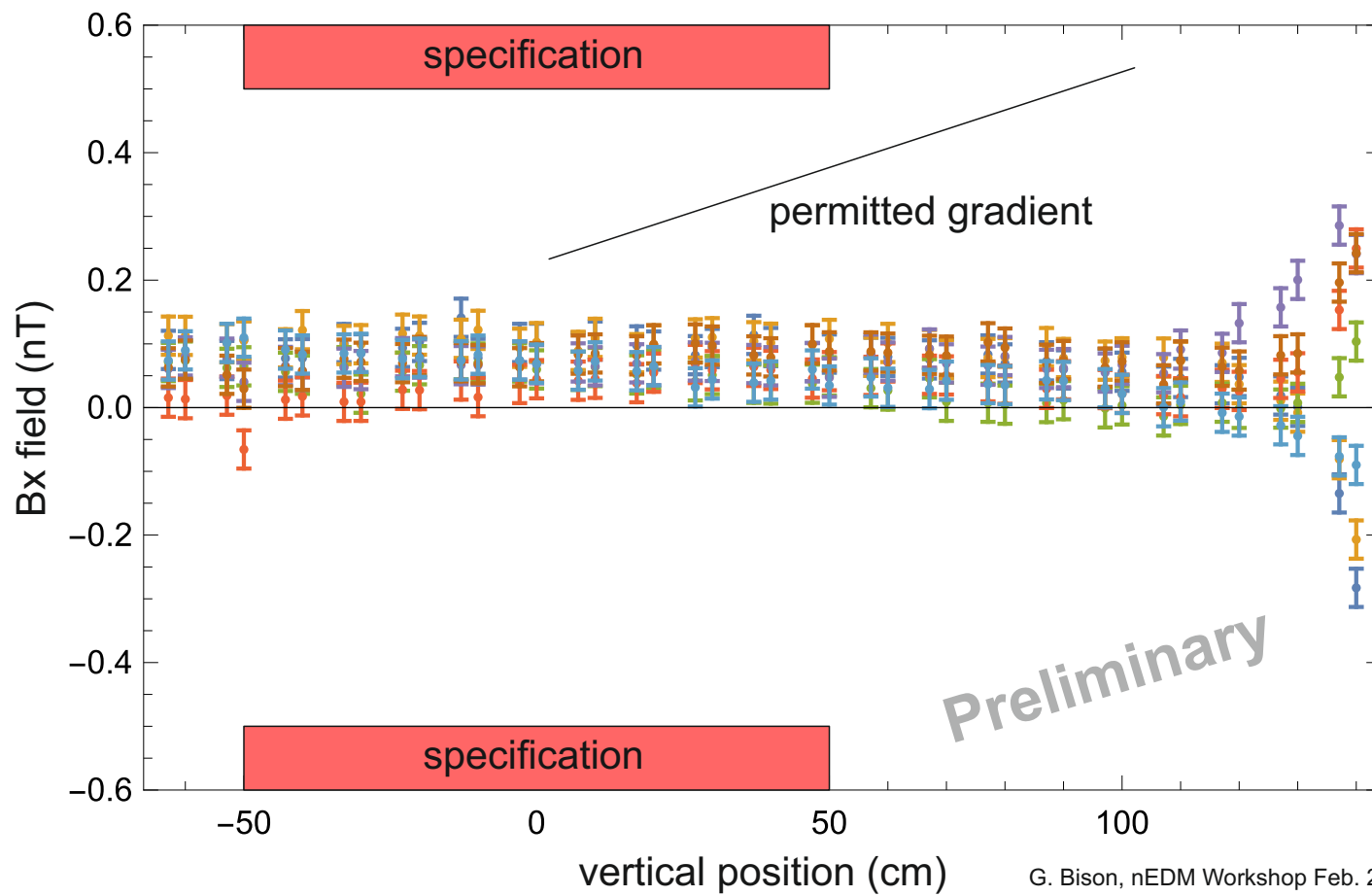


**repeatability of  $B_x$   
and  $B_y$  measurements  
after four days (pT)**

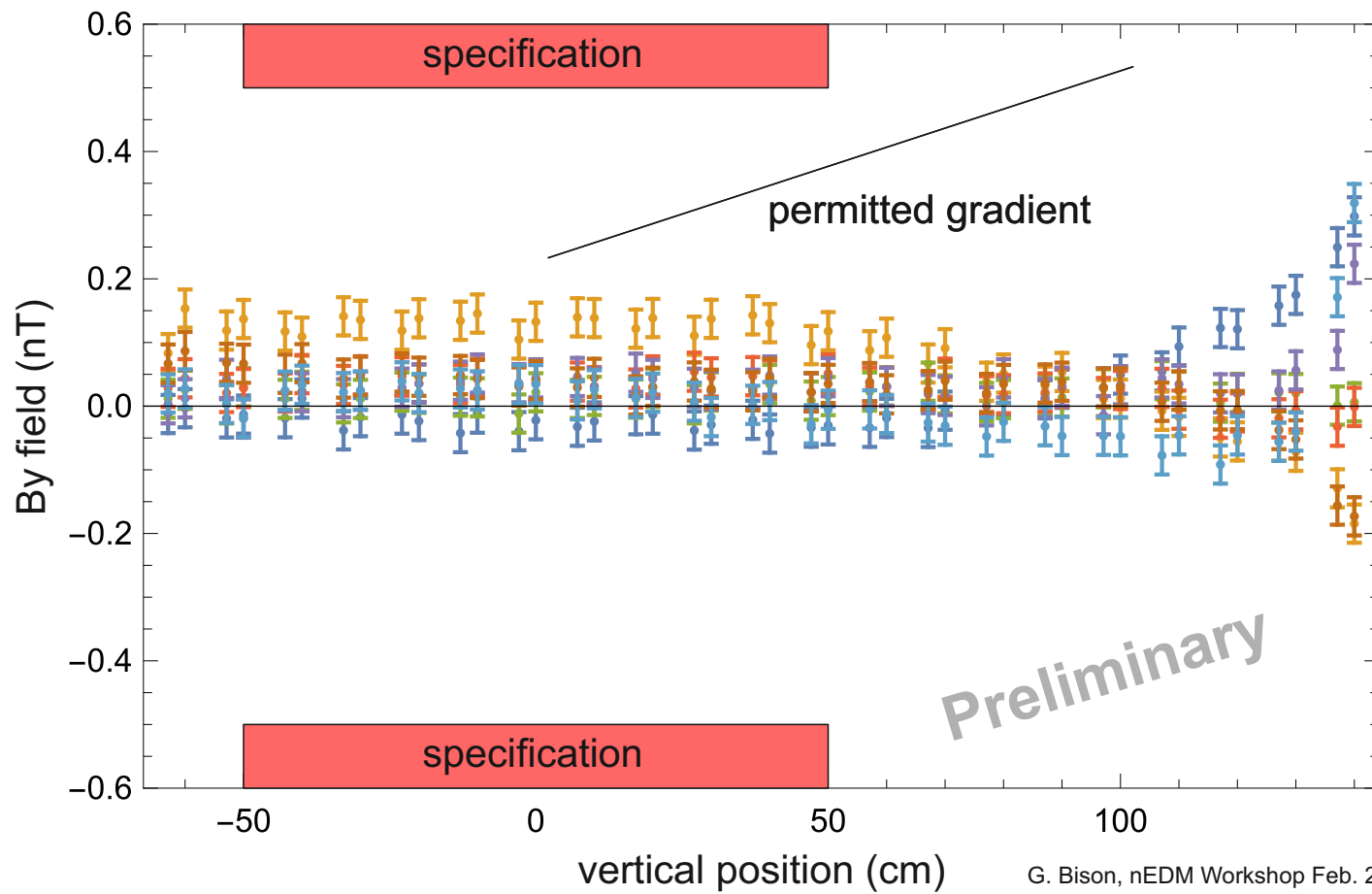


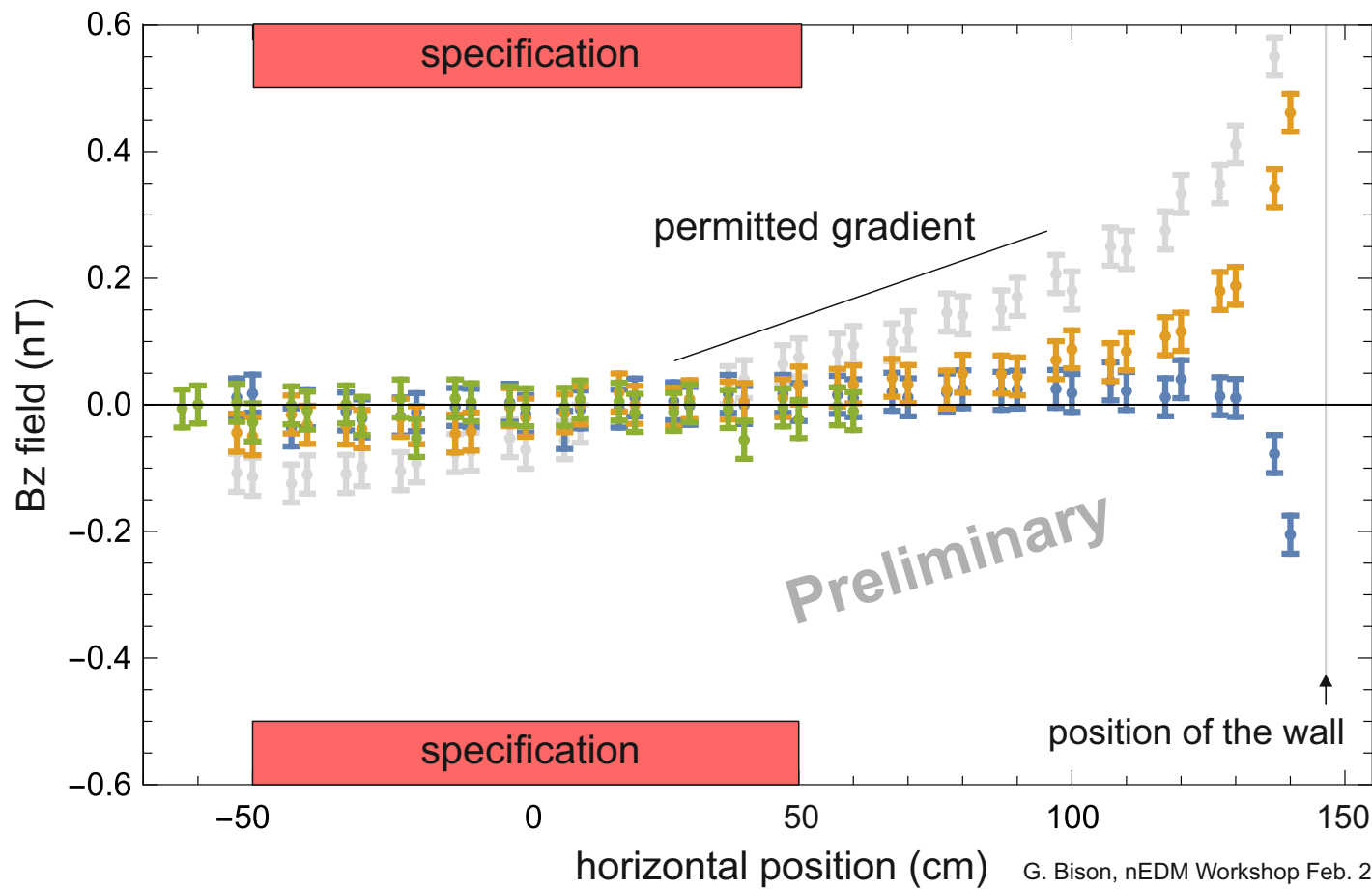


# Vertical scan Bx



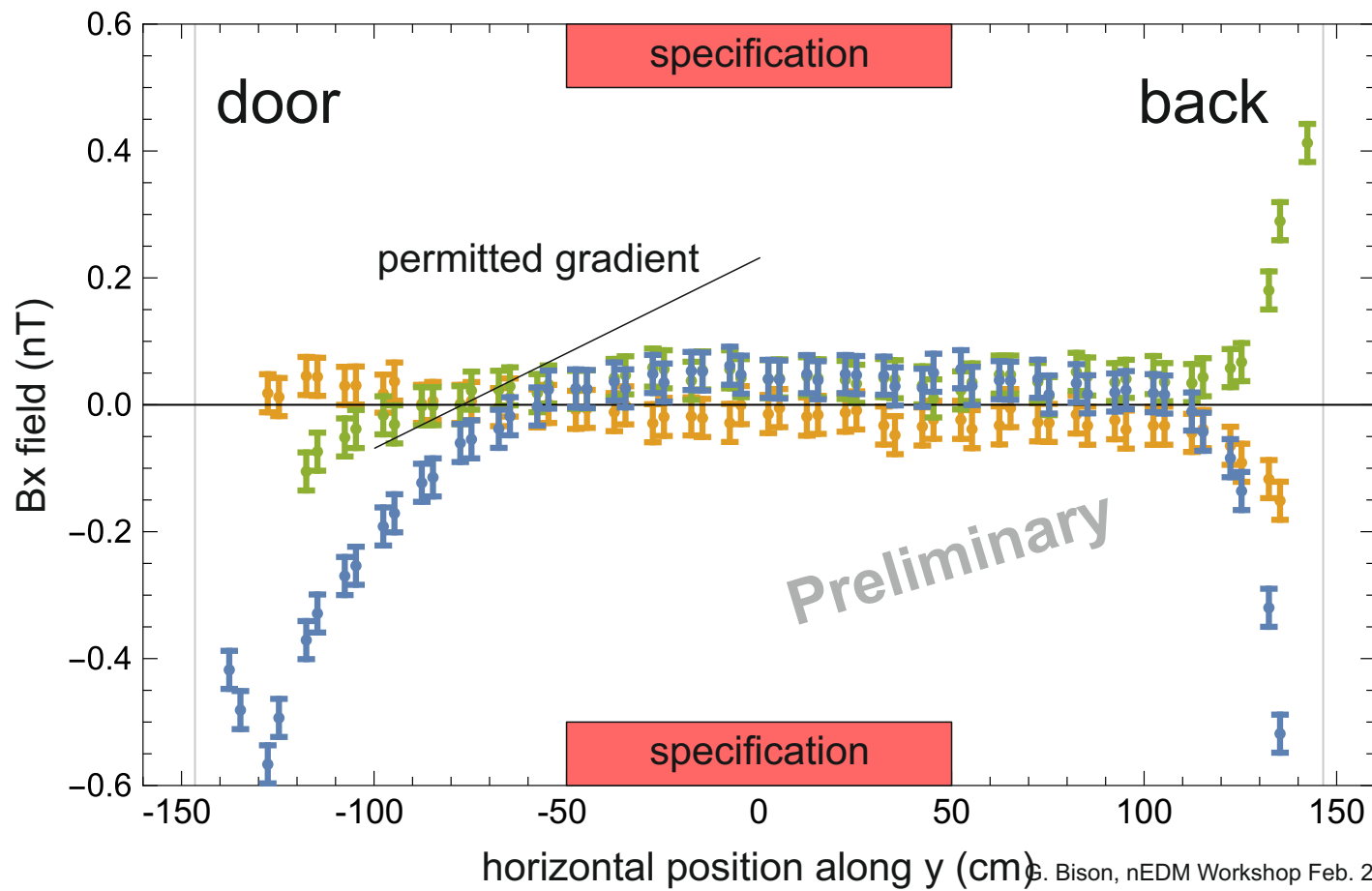
## Vertical scan By



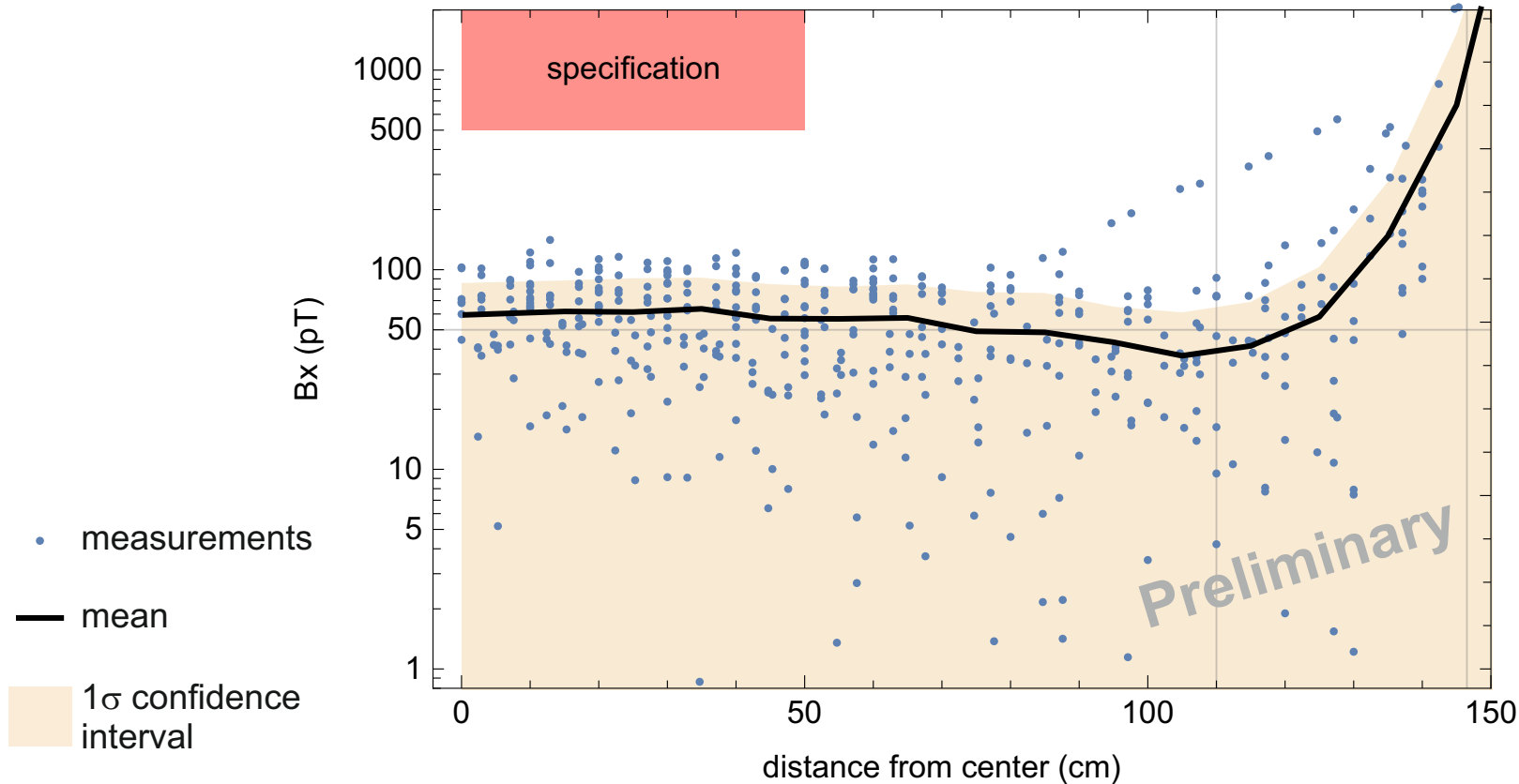




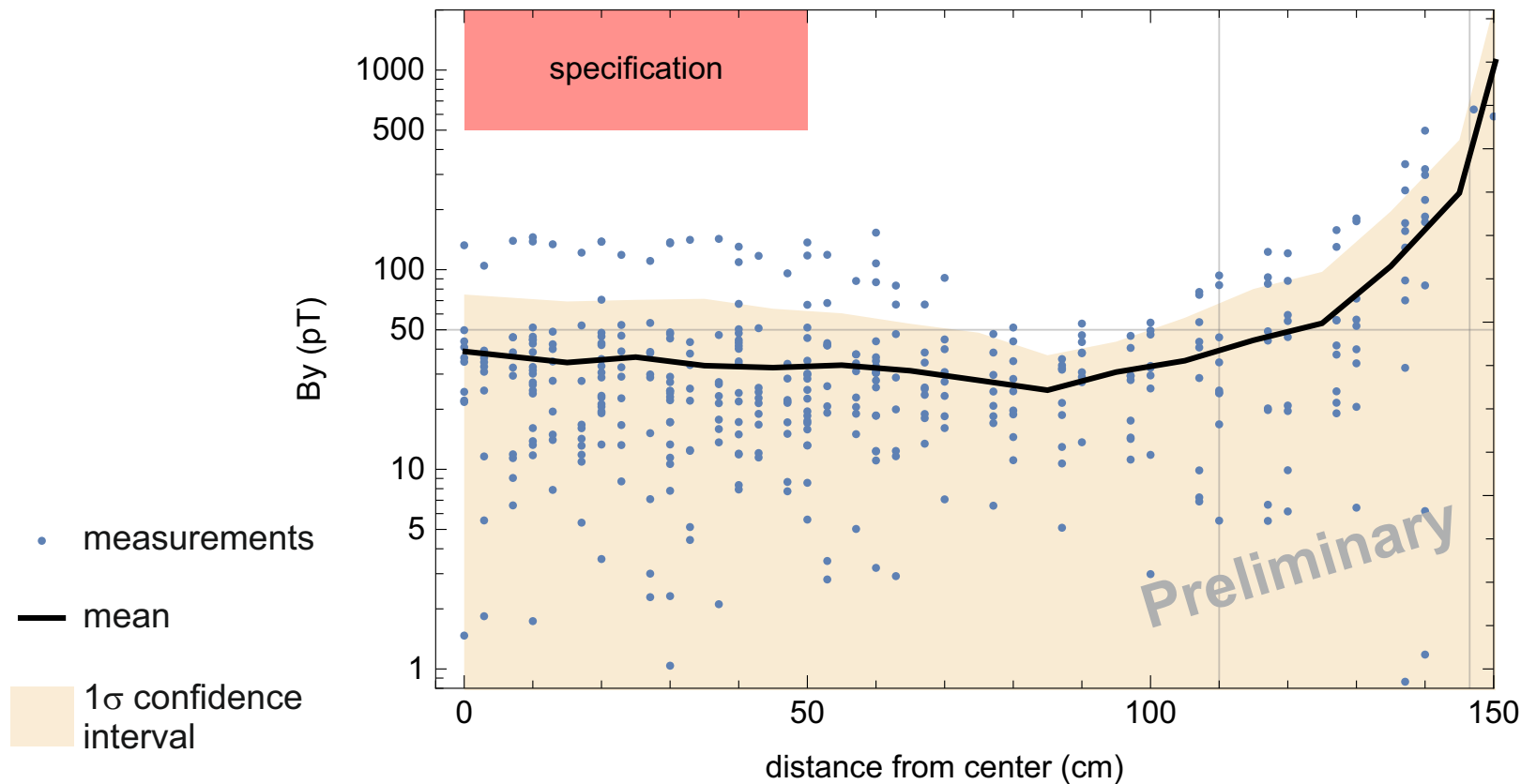
## Horizontal scan Bx



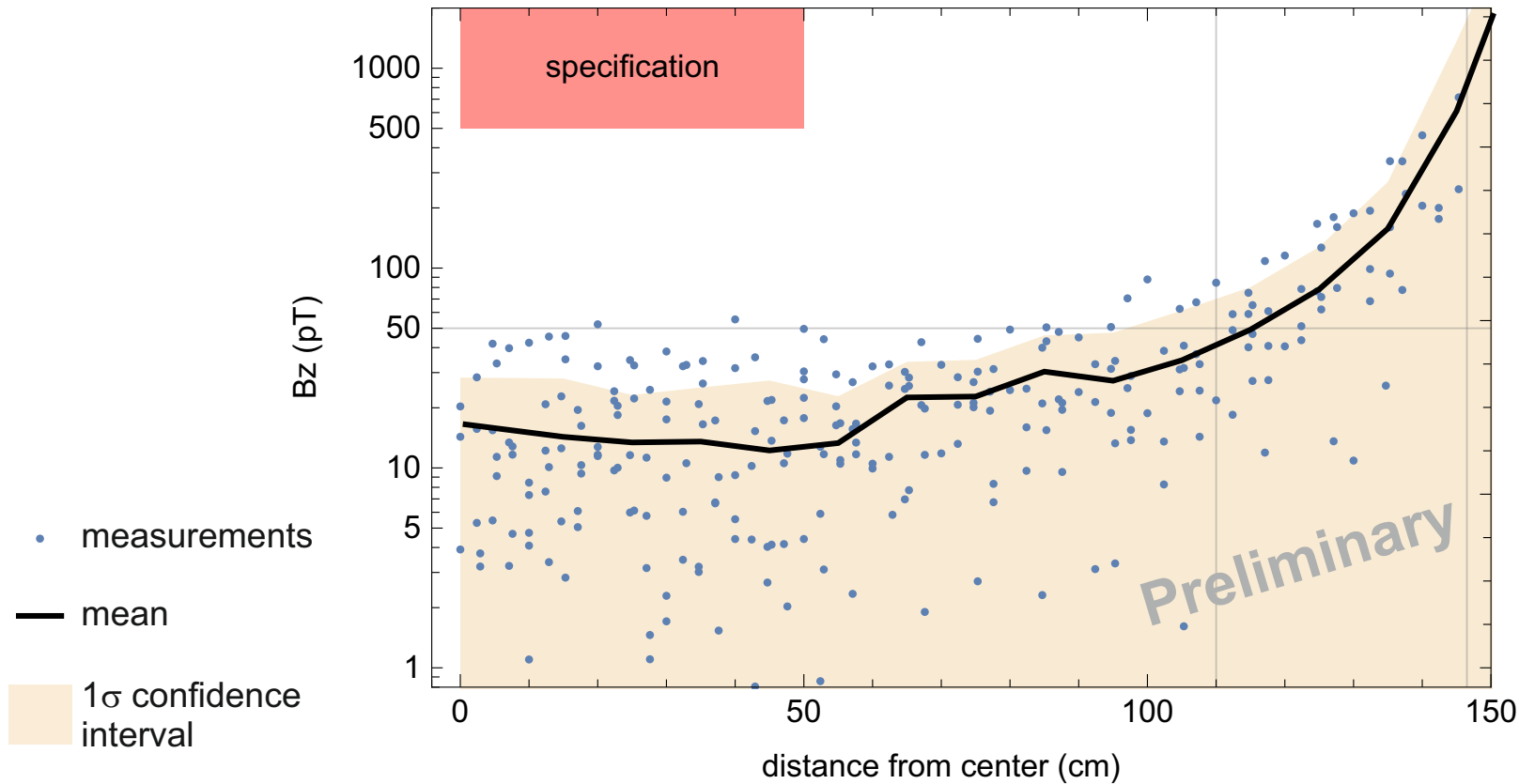
## All Bx measurements combined



## All By measurements combined



## All Bz measurements combined



**The n2EDM shield is complete and fulfills all specifications.**

**An automatic degaussing procedure was established.**

**The remanent field is very small and almost free of gradients.**

**Next steps include the installation of the B0 coil and the mapping of the internal fields with an automatic mapper.**





