Agenda of ORNL-UTK-UKY-LU zoom meeting
February 17, 2026, at 3:30 PM EST

Please, send your slides for INDICO posting
https://indico.phy.ornl.gov/event/979

1. Leah	5'	Progress with paper editing
2. Shaun	10'	Magnets back at UT. Pressure measurement and comparison.
3. Nathan and Linus	10'	Progress with calculations for paper
4. Yuri	5'	Beam request IPTS proposal due March 3
5. Yuri	10’	Some ideas for nTMM analysis
6. Mubi	10'	magnet work at UKY
7. Linus	10'	magnet work at LU
8.		AOB

Pressure Test

By
Shaun Vavra

THE UNIVERSITY OF
TENNESSEE
KNOXVILLE

Measurement on 06 November 2025

	Magnet #7	Magnet #8
14.423 $psia$	19.374 ± .001	18.887 ± .001

Measurement on 16 February 2026

	Magnet #7	Magnet #8
14.423 $psia$	19.200 ± .001	18.635 ± .001

This was taken with door open and the magnets exposed to the outside air temperature.

Measurement on 17 February 2026

	Magnet #7	Magnet #8
14.358 $psia$	19.305 ± .001	18.724 ± .001

This was taken inside SERF room 211.

February 17, 2026 • Y.K

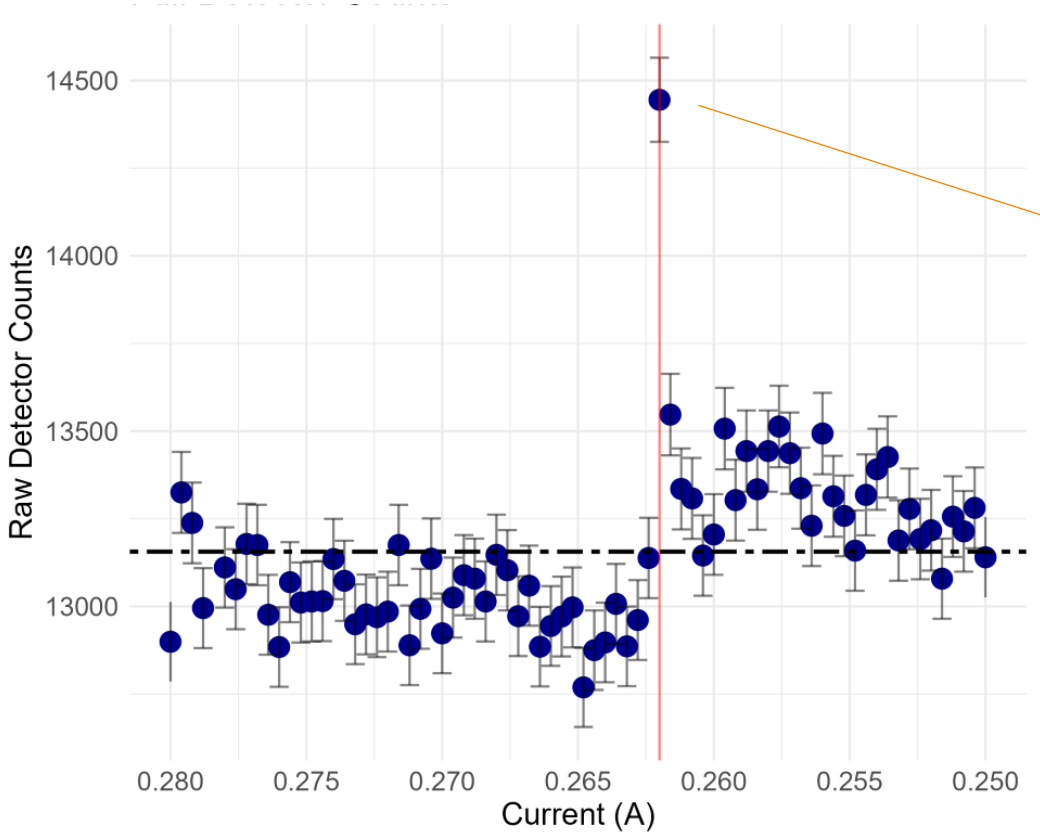
For IPTS-34190.1 beam time proposal

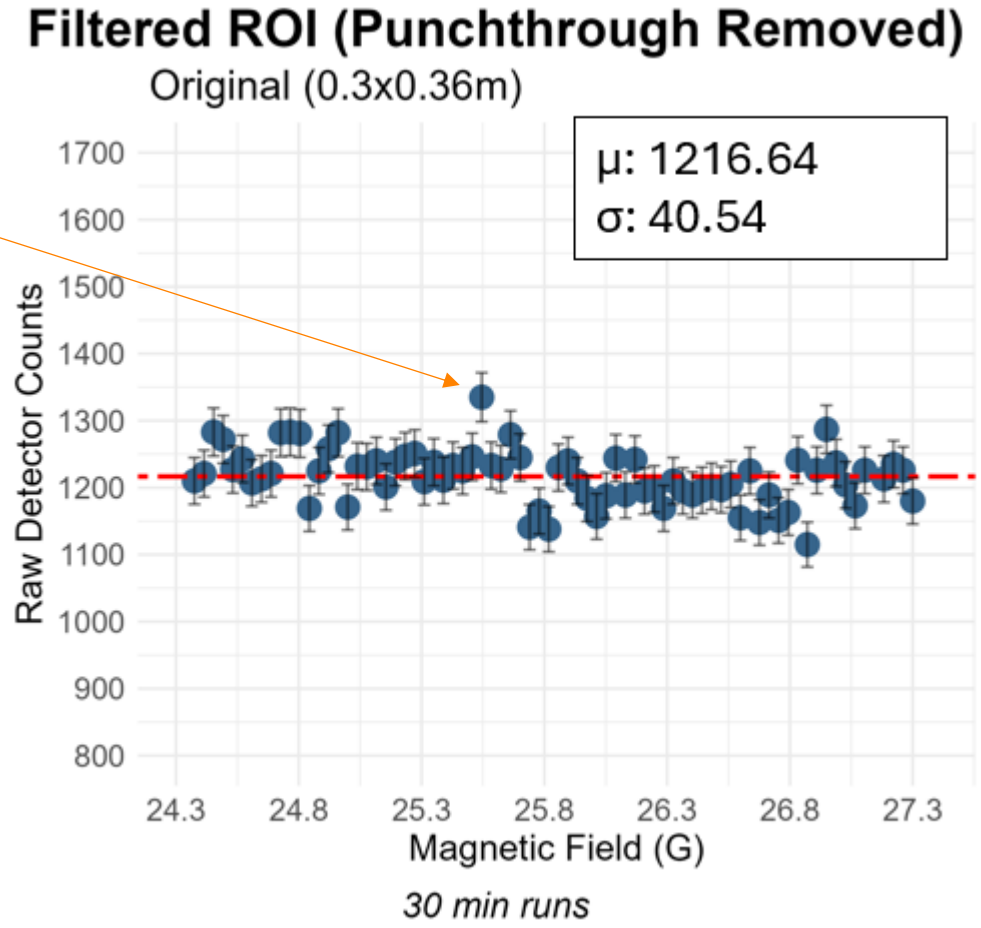
- requesting 5 days of beam time.
- List of authors

Previous cold neutron work of our group included two measurements performed at SNS MagRef instrument and three measurements performed at HFIR CG-2 beam line using GP-SANS instrument. The scope of initial four measurements was to search for neutron to mirror neutron transformation (n -> n') within the theoretical model of Mirror Dark Matter with small mass difference Δm between states of n and n'. Result of the first SNS measurement IPTS-22937.1 was published in Physical Review Letters and allowed to exclude the model explaining neutron lifetime anomaly as effect of n->n'. Second SNS measurement IPTS-22937.2 was published in Physical Review D and has improved the n->n' search limits by reducing detector background and improving statistics together with more accurate beam intensity determination. CG-2 beam line at HFIR allowed colder neutron beam spectrum and higher beam intensity by factor ~ 300 above that in MagRef beam line. The GP-SANS measurements IPTS-24916 (2021) and IPTS-27957 (2024) were analyzed together and currently being prepared for publication in PRD journal. These measurements provided the ultimate limit for n->n' search (within the Mirror Matter model with Δm mass difference) possible within user's program with intense CG-2 HFIR beamline. Systematics of cold beam intensity measurement of CG-2 was carefully studied. **Our latest measurement** in September 2025 (IPTS-32128) was using two specially built 26-Gauss solenoidal magnets around the vessels containing CO2 gas at pressure 19 psia (~ 1.3 atm) within sections 7 and 8 of GP-SANS neutron vacuum guide for detection of n->n' by regeneration method within the Mirror Matter model with neutron transition magnetic moment (nTMM measurement). Measurement was carefully prepared and was performed very efficiently within three allocated days, however suffered from three factors emerged in the process of installation and measurements that significantly reduced the search sensitivity. First factor was small ~2% CO2 gas leak in one of the magnets induced in the process of magnet transportation and installation. Second factor was observed large environmental magnetic field of the steel components of the GP-SANS elements that was not anticipated in the experiment design and required in-situ installation of additional magnetic shielding around the magnets. Third factor was larger than expected rate of background in GP-SANS detector due to use of 1/8" Cadmium for neutron beam absorption between two magnets. Due to overlooked absorption cutoff of Cd high-energy neutrons (of > eV energy) almost doubled the detector background. In the next measurement proposed here these factors will be removed. Analysis of IPTS-32128 data is pursued by our grown collaboration that include group of researchers from ORNL, UTK, University of Kentucky, and Lund University (Sweden).

An idea for nTMM analysis

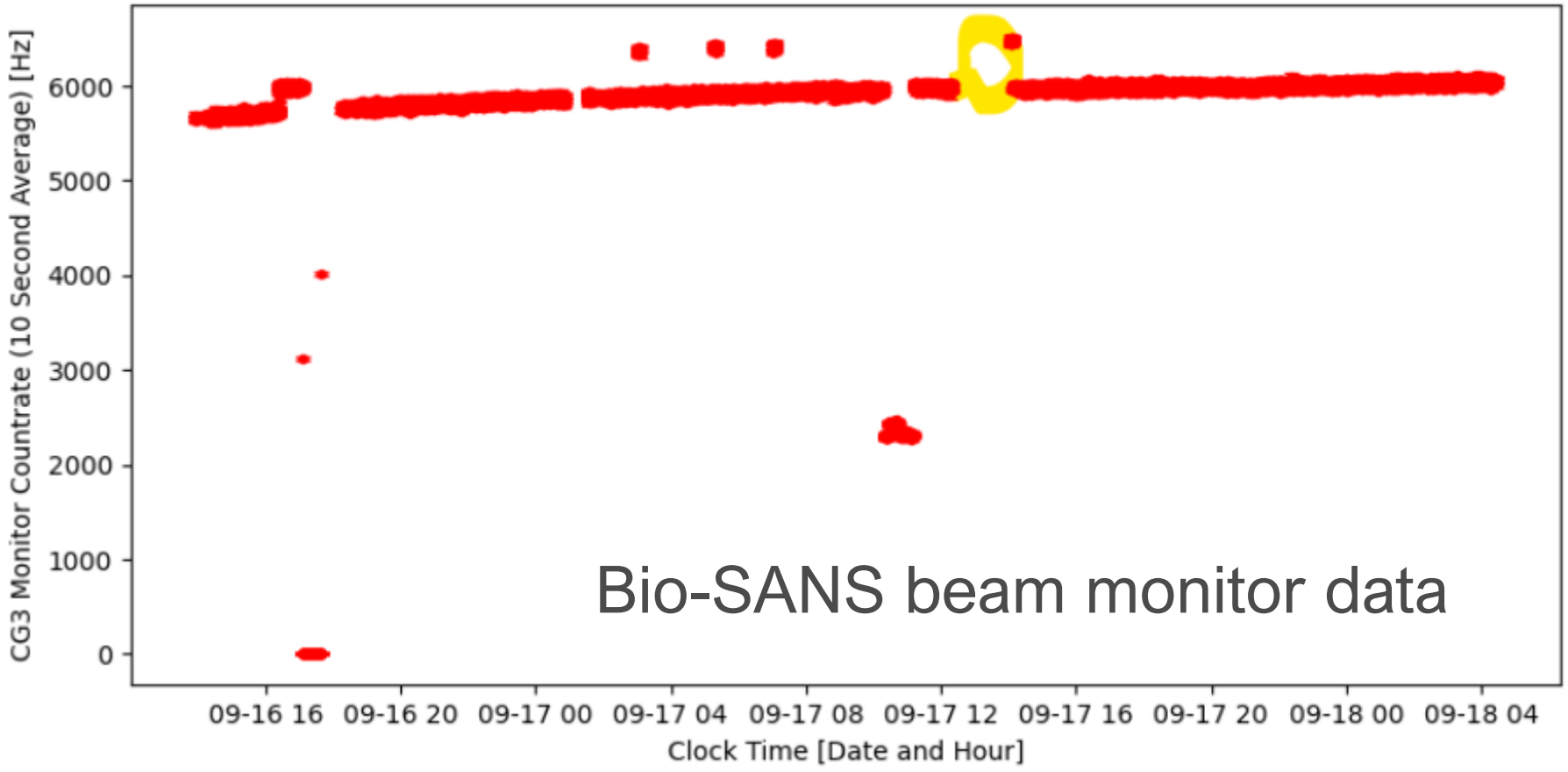
Full Detector Counts

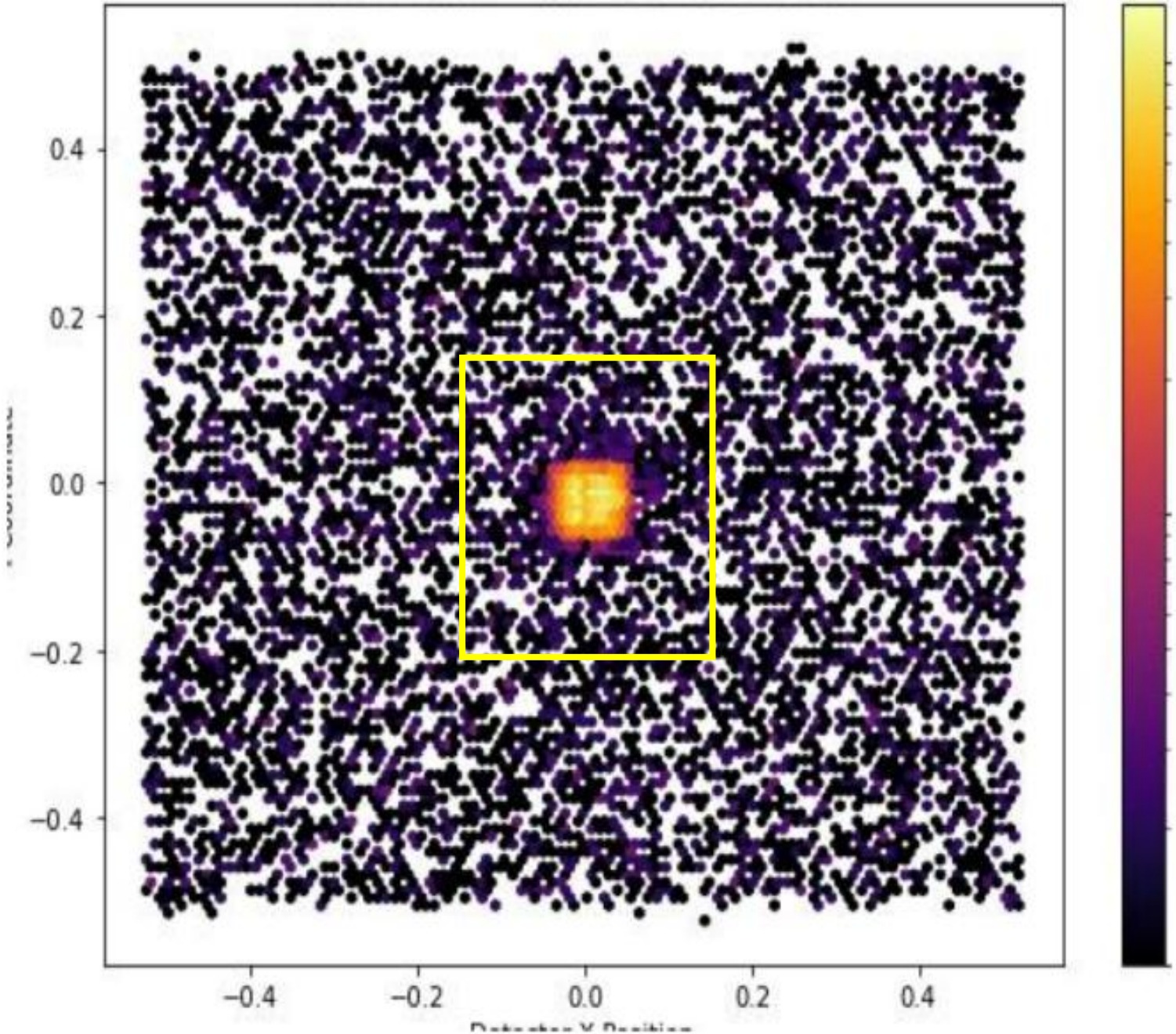




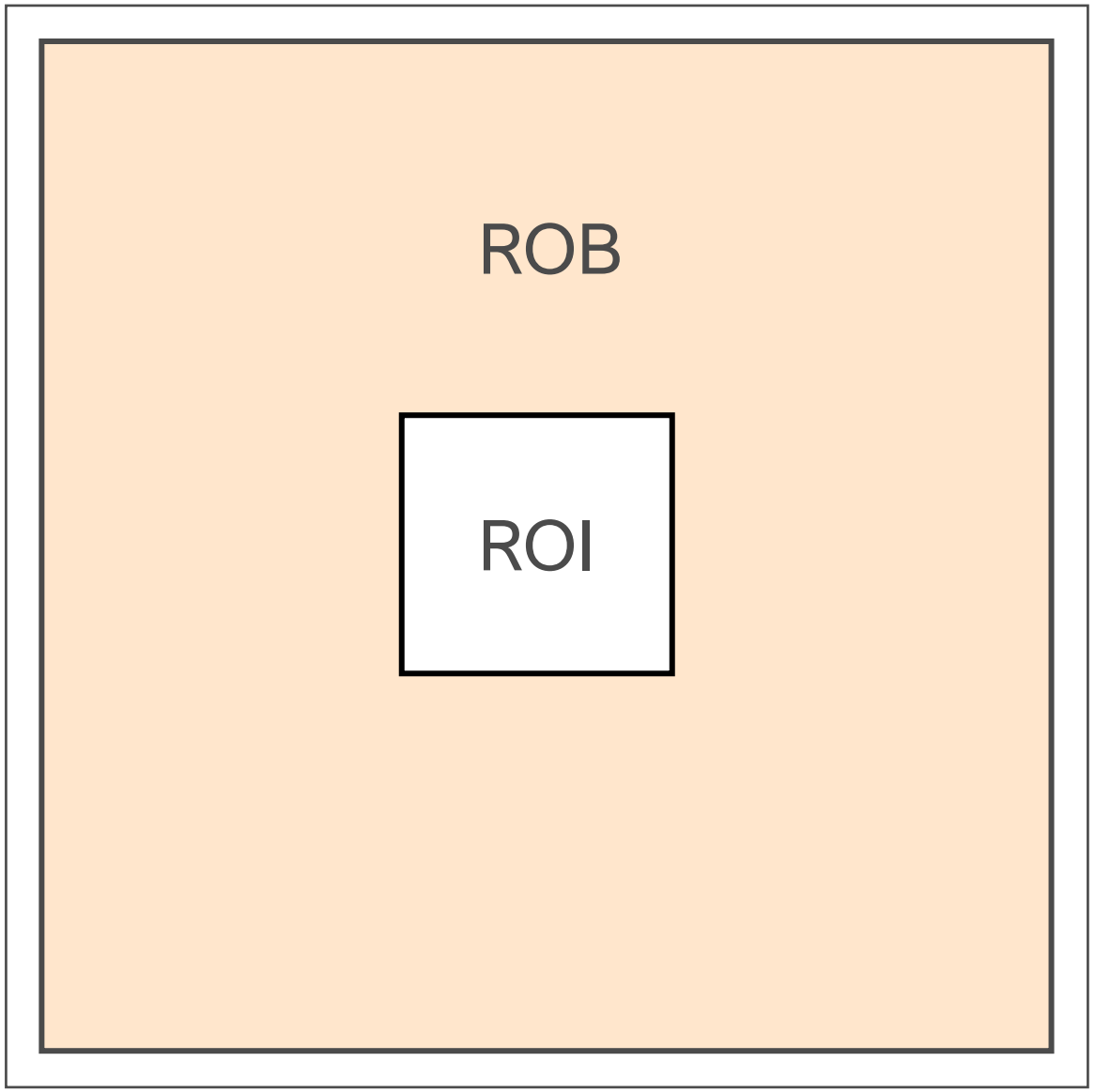
Lisa, what was happening in Bio-SANS?

At the time of the peak of background in GP-SANS on **September 17 - 2025 between 12:50 pm and 1:21 pm**
DAQ of Bio-SANS was not working





Notice uniformity of background in the whole detector (minus hot spot)



A1 ≡ ROI area 0.3 x 0.36 m^2 = 0.108 m^2 with counts C1

A2 ≡ ROB area:

0.95 x 0.95 m^2 - 0.3 x 0.36 m^2 = 0.794 m^2 with counts C2

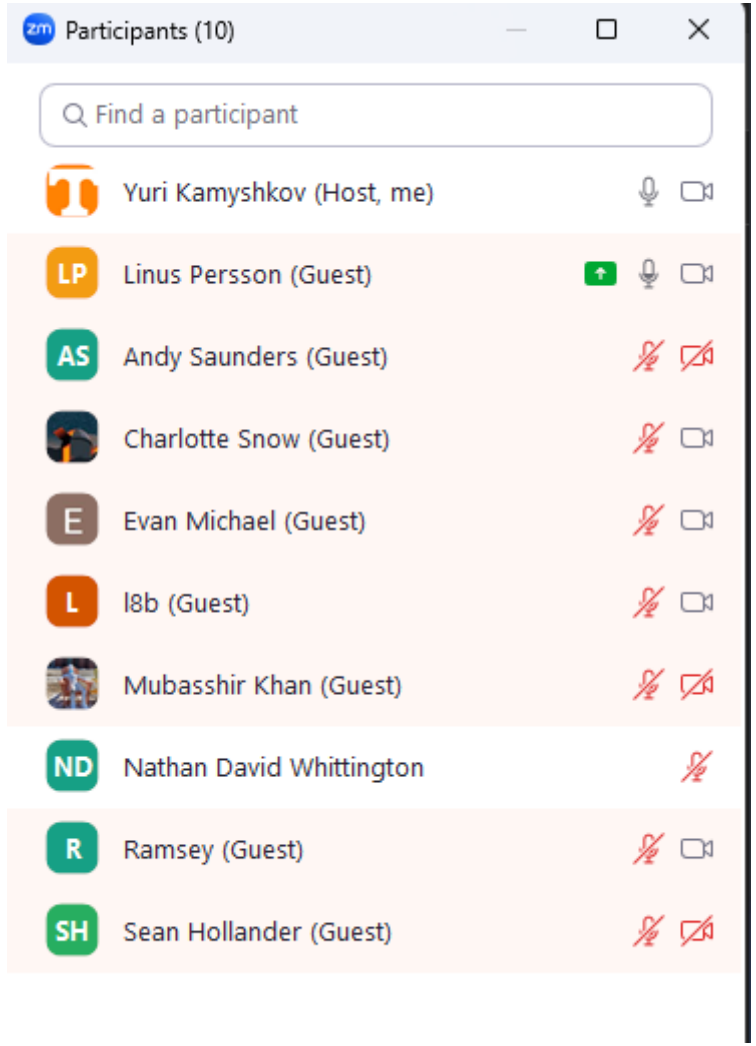
For each 30 min (20 min) run i we can subtract from ROI area-rescaled background from ROB to obtain signal S

$$S_i = C1_i - C2_i \cdot A1/A2$$

- Statistical error of S_i will be slightly increased compared to C1
- Peak (from Bio-SANS) can be removed
- Signal in every run should be not affected
- S_i for $i = 1{,}76$ can be used for fitting nTMM effect

Leah suggested to look at the ratio:

$$R_i = C2_i / C1_i \quad i = 1{,}76$$ (for 30' and 20' runs)


Participants (10)
Find a participant
Yuri Kamyshkov (Host, me)
LP
Linus Persson (Guest)
AS
Andy Saunders (Guest)
Charlotte Snow (Guest)
E
Evan Michael (Guest)
L
l8b (Guest)
Mubasshir Khan (Guest)
ND
Nathan David Whittington
R
Ramsey (Guest)
SH
Sean Hollander (Guest)