Agenda of the meeting:

1. nTMM Dry run on July 9-10	Yuri 10’
2. h5 to ASCII converter for nTMM data	Matt 10’
3. Schedule of Detector threshold scan with neutrons	Arina 10’
4. prototype + COMSOL at UKY	Mubi 10’
5. Planned mag. prototype at UT	Shaun 10’
6. Comments to JPARK n-lifetime paper	Cary 10’

- nTMM Dry run (no neutrons) on July 9th – 10th
- data in format *.nxs.h5 extracted to UT cloud
  (can be downloaded from https://oncat.ornl.gov/#/)
- 64 files × 30′ no neutrons run numbers ## 141981 – 142045
- Matt has a code that will convert data to ASCII (more convenient)

What is in data:

Current : tarting from 0.3500 A in each 30' run current was decremented by 0.0004 A.
DAQ was not recording current and voltage from power supplies (bug to be fixed)

Detector: was positioned at 2 m from "sample" , threshold 200 (control units)
Whole detector counting rate 1.75 cps after long reactor shutdown.
(should improve at 20m – Lisa will measure later)

Thresholds: discrimination curves are measured with gamma-source
(data per each detector tube exist as analyzed by Matt)
Neutron Cf source discrimination curves will be measured next week (Lisa)

GP-Monitor counting few without reactor neutrons

Thermocouples: 5 and 5 channels for each magnet. 4 (out of 10) are in DAQ
6 (out of 10) are recoded 0.1 Hz in Data Logger

Magnetometers: One per magnet, 1 Hz readout to DAQ OK

μ - metal shielding factor measurement in the UT prototype (to be constructed)

- 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 μtube: 6.5” diameter
- 2 layers 18 AWG wires – 5,200’ is needed (3 ×10 lbs spools)
- Central hole ~ 2.5” for Bartington magnetometer insertion
- Supporting plastic construction needed (design + UT shop)
- Material cost < 1,500 $
- UT Bartington 3D Magnetometer <10 Gauss can be used
- For higher fields can use existing 3D chip magnetometer (<50 G)

Measurements can include bar magnet for external ~ 8 Gauss perturbation.
Magnetometer in the center of solenoid, 10 Gauss field (Bartington max)

1. Single non-degaussed Ø7.5” shield; without/with mu-shield
2. same but after degaussing of mu-shield
3. inside 10 G solenoid with Ø7.5” shield: without/with bar magnet
4. same after mu-metal degaussing
5. add additional 9” mu-shield (no degaussing) without/with bar magnet
6. Effect of local (short 16” long) shield without/with bar magnet

- Goal: compare measured shielding factor with COMSOL simulated to find effective μ for mu-metal Ø7.5” shield saturated by solenoidal field

$\tau_n = 877.2 \pm 1.7_{(\text{stat.})}\ ^{+4.0}_{-3.6(\text{sys.})}$. The combining average yielded $\chi^2/\text{DOF} = 15.8/3$, though the underlying cause of this deviation remains undetermined.

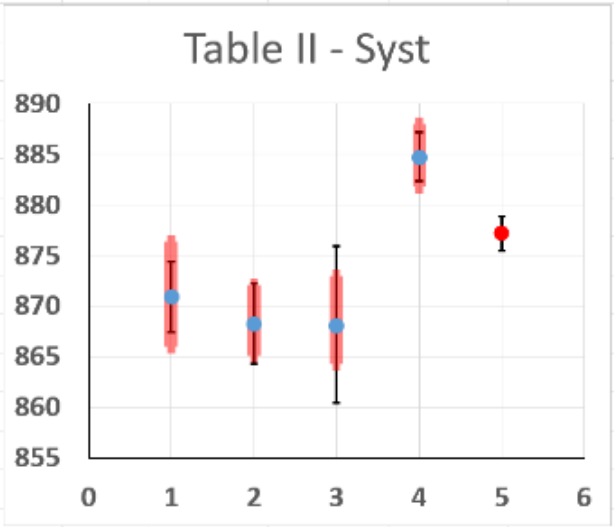
TABLE II. Neutron lifetime values for each gas pressure (100 kPa, 50 kPa) and SFC configuration (new, old), with averages. Units in seconds.

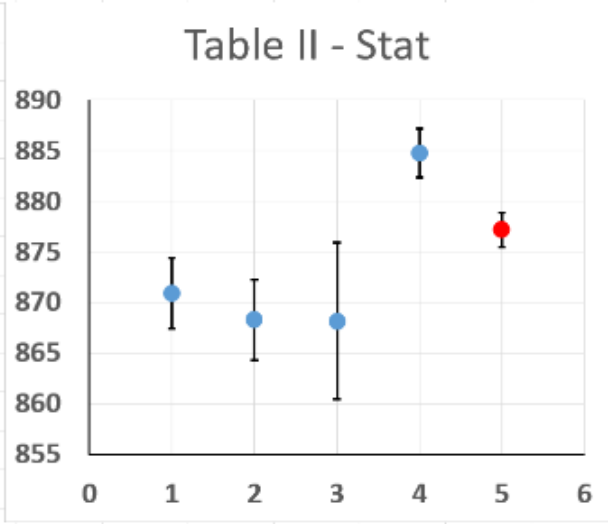
Conditions	Value	Stat.	Cut position	Other sys.
100 kPa/old SFC	870.9	3.5	+1.8/-2.8	+5.5/-4.9
100 kPa/new SFC	868.3	4.0	+1.5/-2.9	+3.8/-3.2
50 kPa/old SFC	868.2	7.7	+2.7/-0.9	+4.8/-3.9
50 kPa/new SFC	884.8	2.4	+0.8/-1.3	+3.2/-3.0
Combined	877.2	1.7		+4.0/-3.6

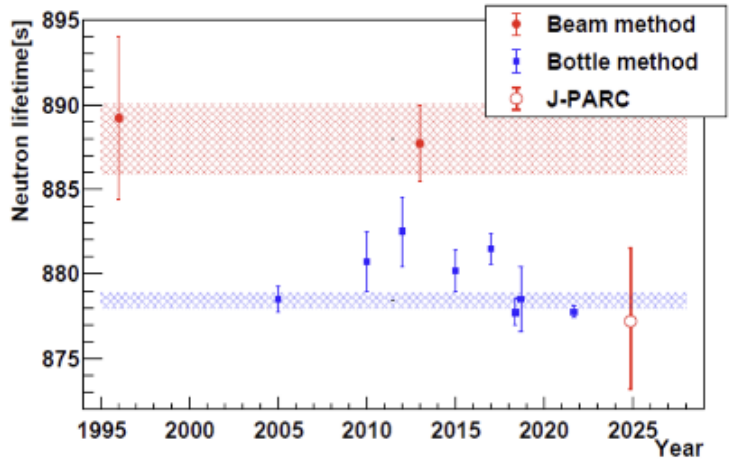
TABLE III. List of uncertainties with units in seconds.

Effect	Uncertainty
Statistic	1.7
Cut position	0.9
Gas-induced background	+1.1/-2.0
Pile up	+1.5/-0.6
Contamination from $^{12}C(n,\gamma)^{13}C$	+1.7/-0.0
γ-ray scattering at LiF shutter	1.3
Unbunched neutron from SFC	+1.1/-1.0
Inject ^{3}He	1.2
^{3}He in G1He	+1.5/-1.4
$^3He(n,p)^3H$ cross section	1.2
Total systematic	+4.0/-3.6

	Value	Stat	Cut +	Cut-	Other+	Other-
1	871	3.5	1.8	2.8	5.5	4.9
2	868	4.0	1.5	2.9	3.8	3.2
3	868	7.7	2.7	0.9	4.8	3.9
4	885	2.4	0.8	1.3	3.2	3.0
5	877	1.7			4.0	3.6







Comments to JPARK n-lifetime paper