Passive 18x snout on TANDM 90-348

Experimental description

Energetic Neutron Platform Working Group and NIF Radiochemistry Group

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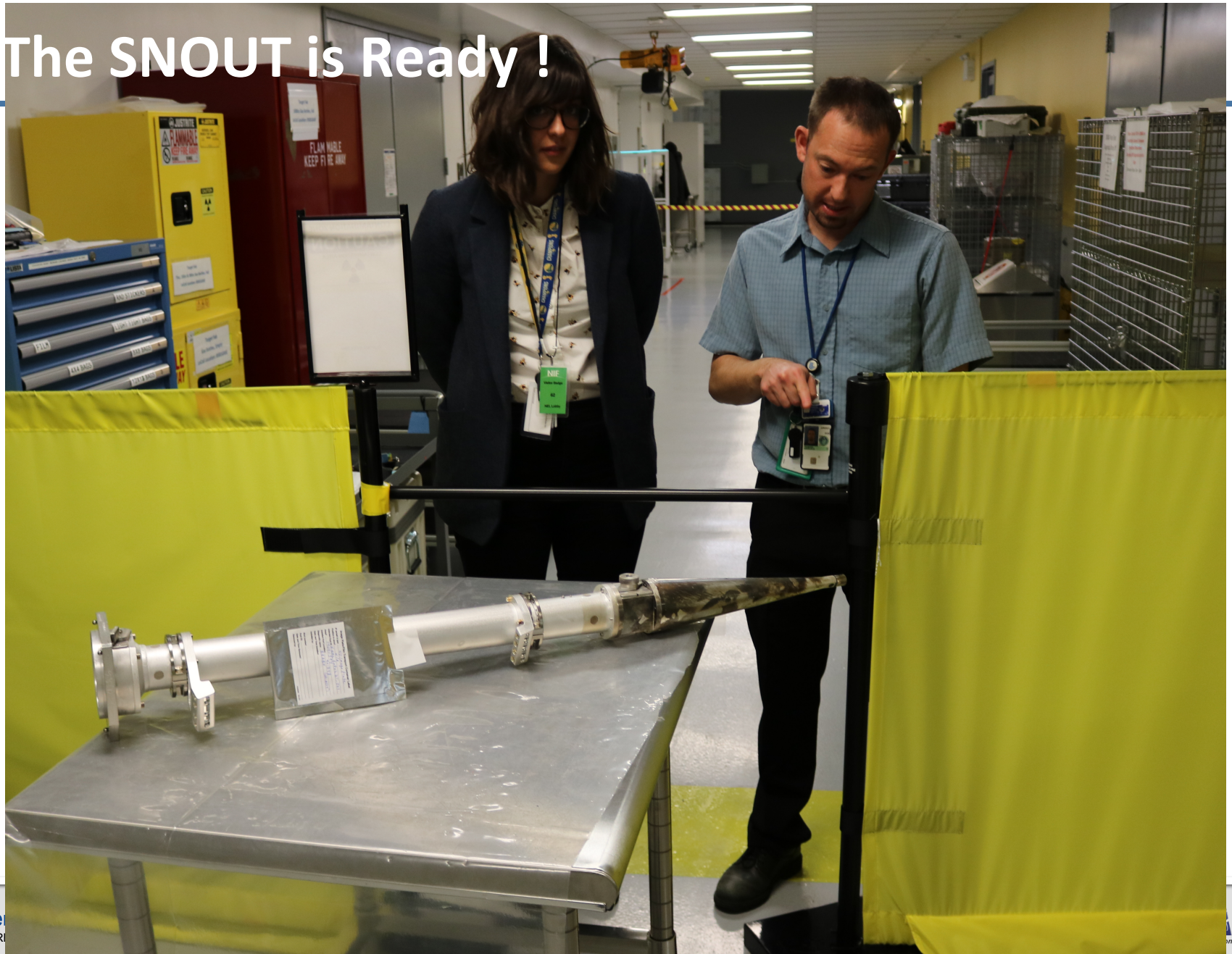
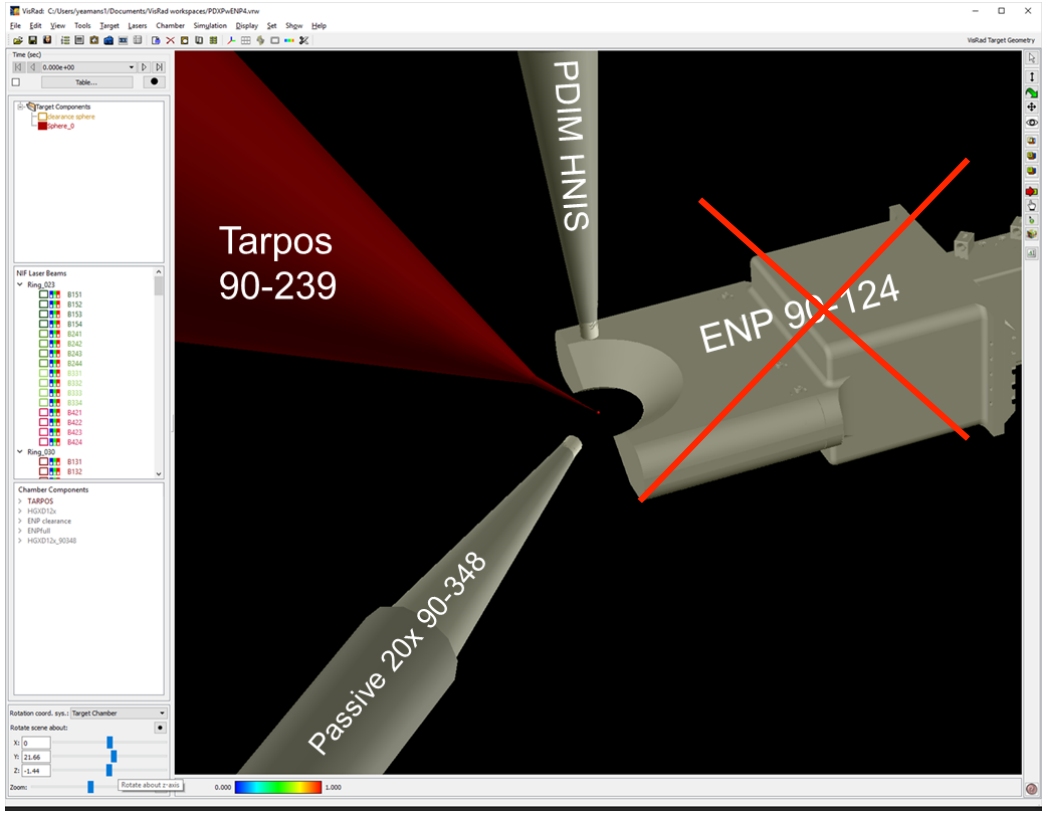
The SNOUT is Ready !

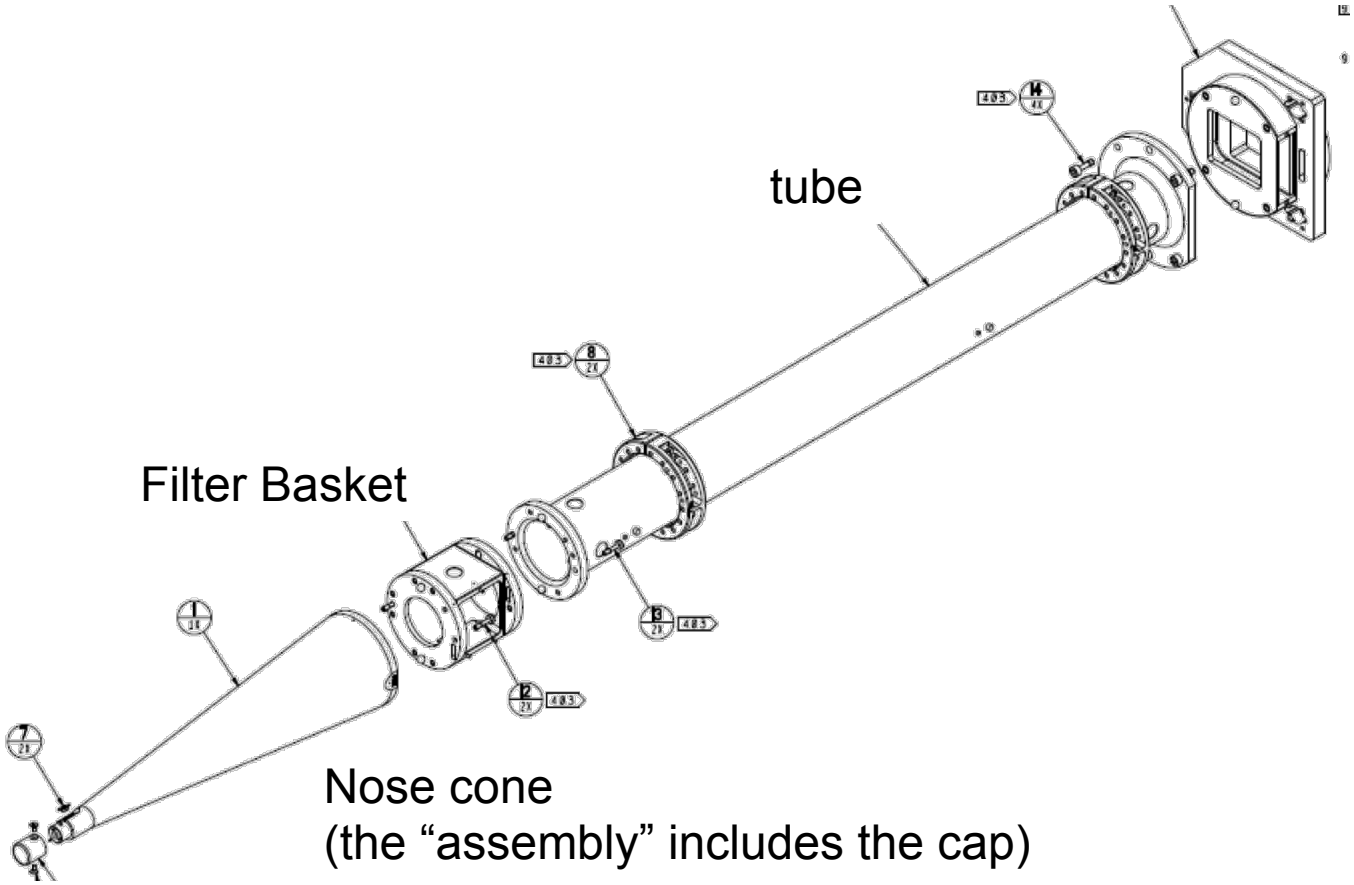


Experimental Configuration Requested N_NED_ExPsh_DT_AAA 3/12/18

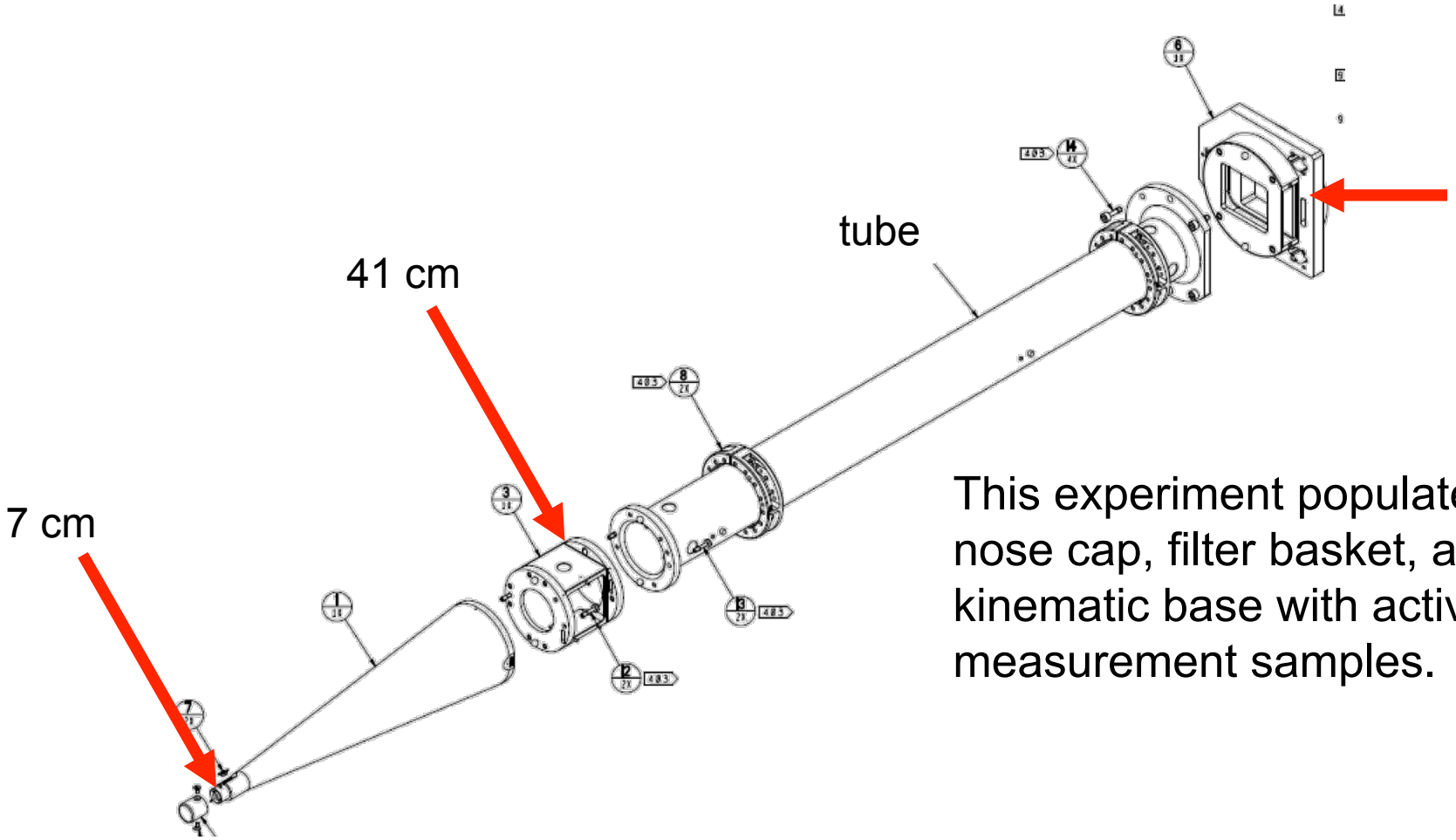


positioner	DLP	TCC standoff (cm)
0-0	HNIS	10
~~90-124~~	~~ENP 90-124~~	~~5.3~~
90-239	Direct drive capsule target	0
90-348	Passive 18x	6

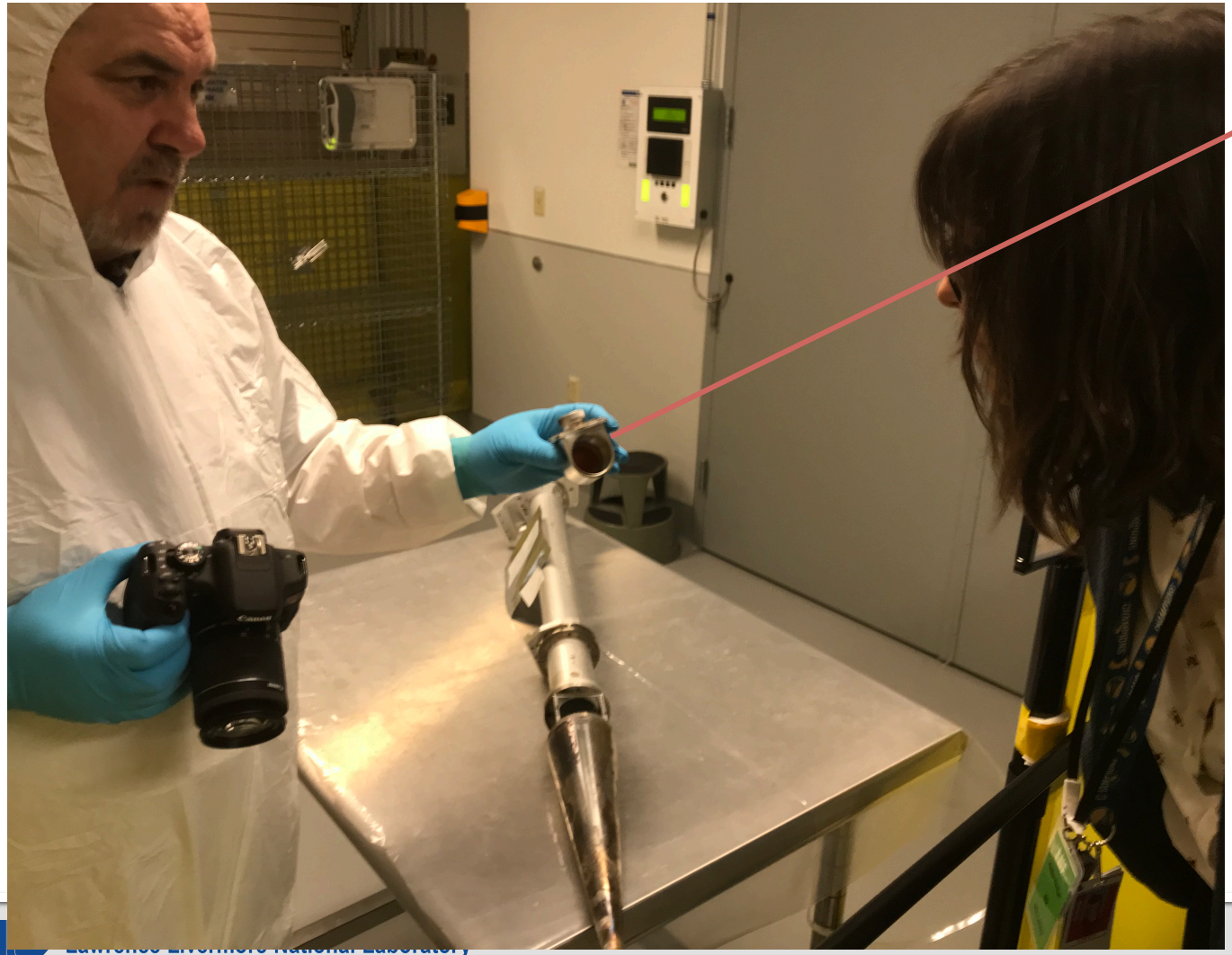
Intro to NIF snout nomenclature



Experimental Configuration Requested N_NED_ExPsh_DT_AAA.

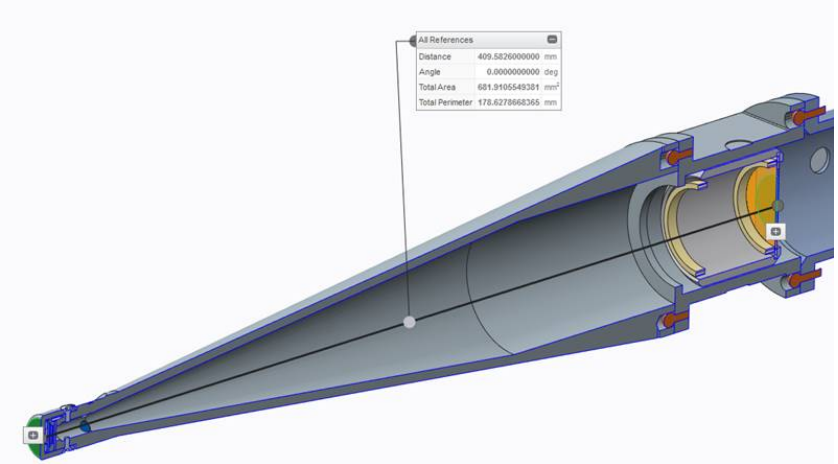


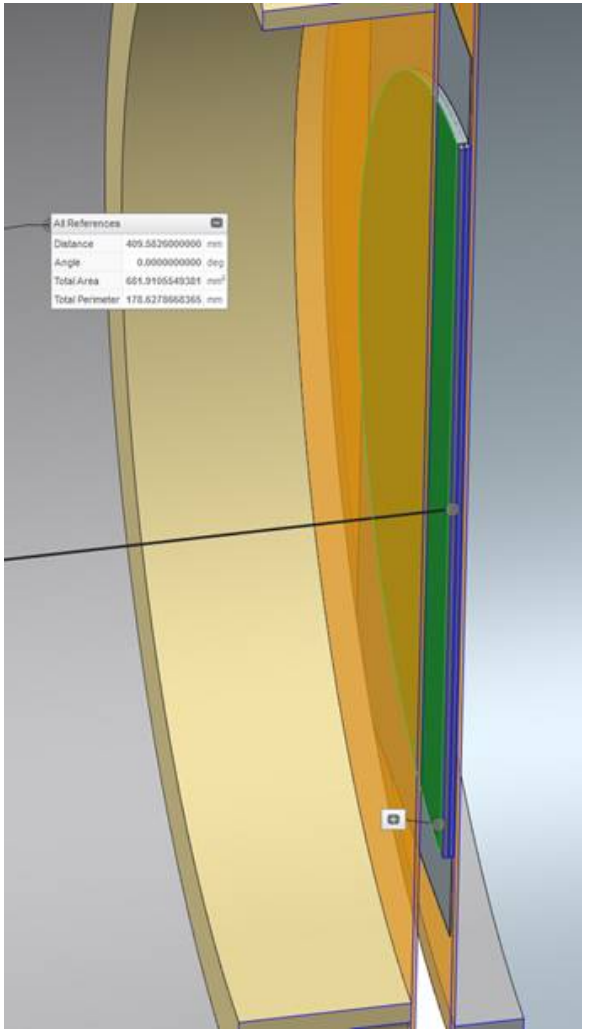
This experiment populates the nose cap, filter basket, and kinematic base with activation measurement samples.


Basket Foils

Filter basket sample standoff

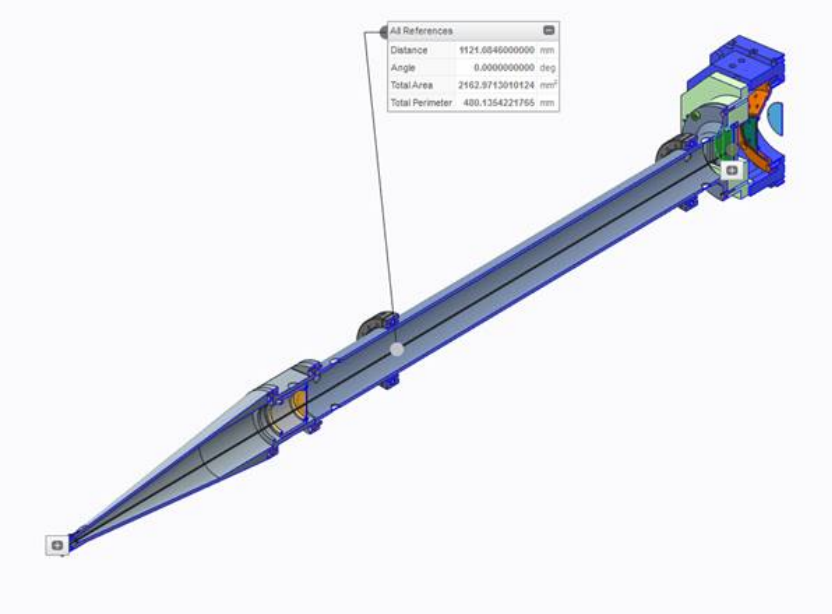
470.01 mm from TCC to the front surface of the filter basket stack

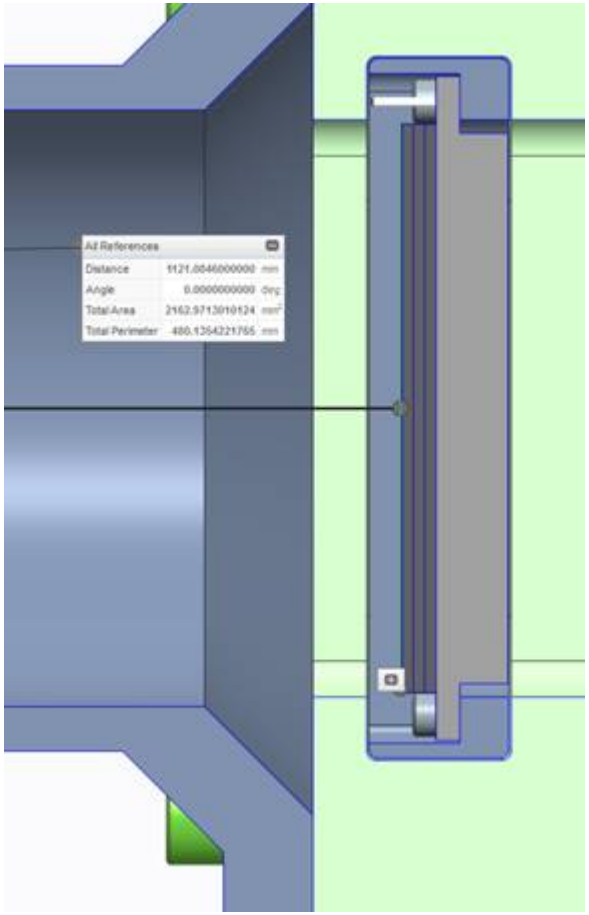




Kinematic base sample standoff

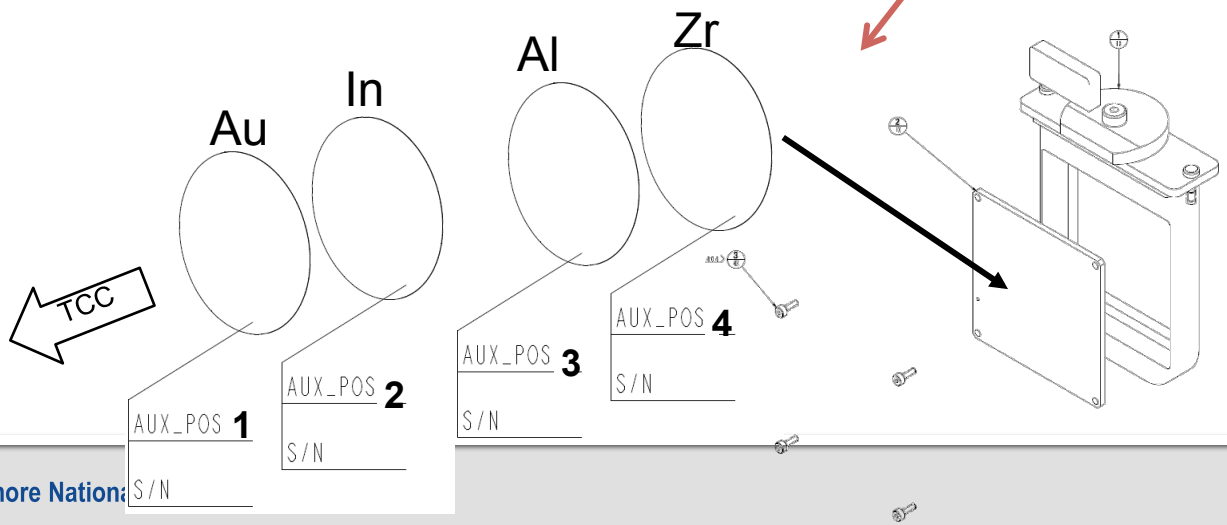
1181.23 mm from TCC to the front surface of the kbase stack.





Passive 18x snout configuration
We got them : *Kinematic base filtering with foils !!*

QTY REQ D	DESCRIPTION	MATERIAL SPECIFICATION	ITEM NUMBER
1	Filter plate, 6.25 thk	Al 6-61-T6	6
1	SRC witness sample plate, 1 mm Zr	Zirconium-702	5
1	Activation sample, 1 mm thk Al	Aluminum	4
1	Activation sample, 1 mm thk In	Indium	3
1	SRC witness sample plate, 0.1 mm Au	gold	2
A/R	Tape, NIF vac approved	Kapton	1



Methodology 1 -

1. Design a NIF experiment that can be fielded in ~6 months with available resources and known materials.

2. Calculate (a MCNP simulation) f4 tallies on the sample volumes:
   a. All cells at zero density
   b. Measurement sample cells at real density, everything else in the universe at zero density
   c. Everything in the universe at real density

3. Convolve f4 tallies with reaction cross sections.

4. Calculate (F, h, e) for all samples and contribution from densities from 2a,b,c.

5. Make measurements of reaction products generated from a NIF 14 MeV source (IDEP, PDXP, DDEP).

6. Calculate (F, h, e) for all samples from data, using a single “absolute yield” measurement as the benchmark.

7. STASYL unfold of spectrum from measurements: determine sensitivity to converged solution on starting point.

Methodology 2 -

- Proceed with the Methodology calculations (activation data, MCNP modeling, STAYSL unfolding …) for foils at tree Frog, pinhole, basket and at the kinematic base !
- MCNP Calculation done with full NIF mode

What is being calculated: Expected signal levels

location	Product nucleus	Standoff (cm) to center	P_{rx} (per g target)	p_{rx}/Ω (per g target)	Sample mass (approx. g)	Product nuclei/ 10^{15} source neutrons
pinhole	In115m	6.47	6.30E-07	2.05E-04	1.2	7.56E+08
pinhole	Zr89	6.85	3.45E-06	0.0158	1.03	3.56E+09
pinhole	Na24	6.66	4.88E-06	0.0211	0.3	1.46E+09
pinhole	Au196	6.66	1.17E-05	0.0506	0.05	5.84E+08
basket	In115m	47.015	1.19E-08	6.54E-05	1.3	1.55E+07
basket	Zr89	47.035	7.33E-08	0.0051	1.4	1.03E+08
basket	Na24	47.025	9.79E-08	0.0067	0.5	4.89E+07
basket	Au196	47.005	2.34E-07	0.0161	0.1	2.34E+07
kbase	In115m	118.673	1.87E-09	1.69E-05	13	2.43E+07
kbase	Zr89	119.173	1.14E-08	0.0013	14	1.60E+08
kbase	Na24	119.173	1.52E-08	0.0017	5	7.62E+07
kbase	Au196	118.173	3.71E-08	0.0042	1	3.71E+07

What is being calculated:

- Each (n,x) reaction gets its own calculated probability
- prx: reaction probability per source neutron emitted in 4pi
- prx/W: reaction probability per source neutron emitted into detector solid angle
- Multiplication target mass by prx and source yield to get: # product nuclei, which is the counting facility measurement and GAMANAL analysis
- Calculation MCNP results as reaction probability: to show the simulation converging on the measurement to demonstrate the necessary level of geometric and physics complexity and tuning