sPHENIX Meeting: Calorimetry Beam Test Prep

Update of Module Production at UIUC

Vera Loggins
12/3/2015

Module Overview

<u>Good Modules</u>: These are the modules that we have checked the overall quality and are used in the density estimations.
Modules #: 3,4,5,6,7,8,9,10,11,12,13,15,16,17,18

Bad Modules: These are the modules that we have checked the overall quality and have *not* included in the density estimations.
Modules #: 0’,1,2,14

Production Improvements

<u>Filling Procedure:</u>

In order to improve the ends of the modules to make them more uniform, we changed the filling procedure for Tungsten.

1. We add a small amount of Tungsten,
2. We shake the Tungsten with the vibration table until it is settled,
3. We then added the remaining powder slowly.

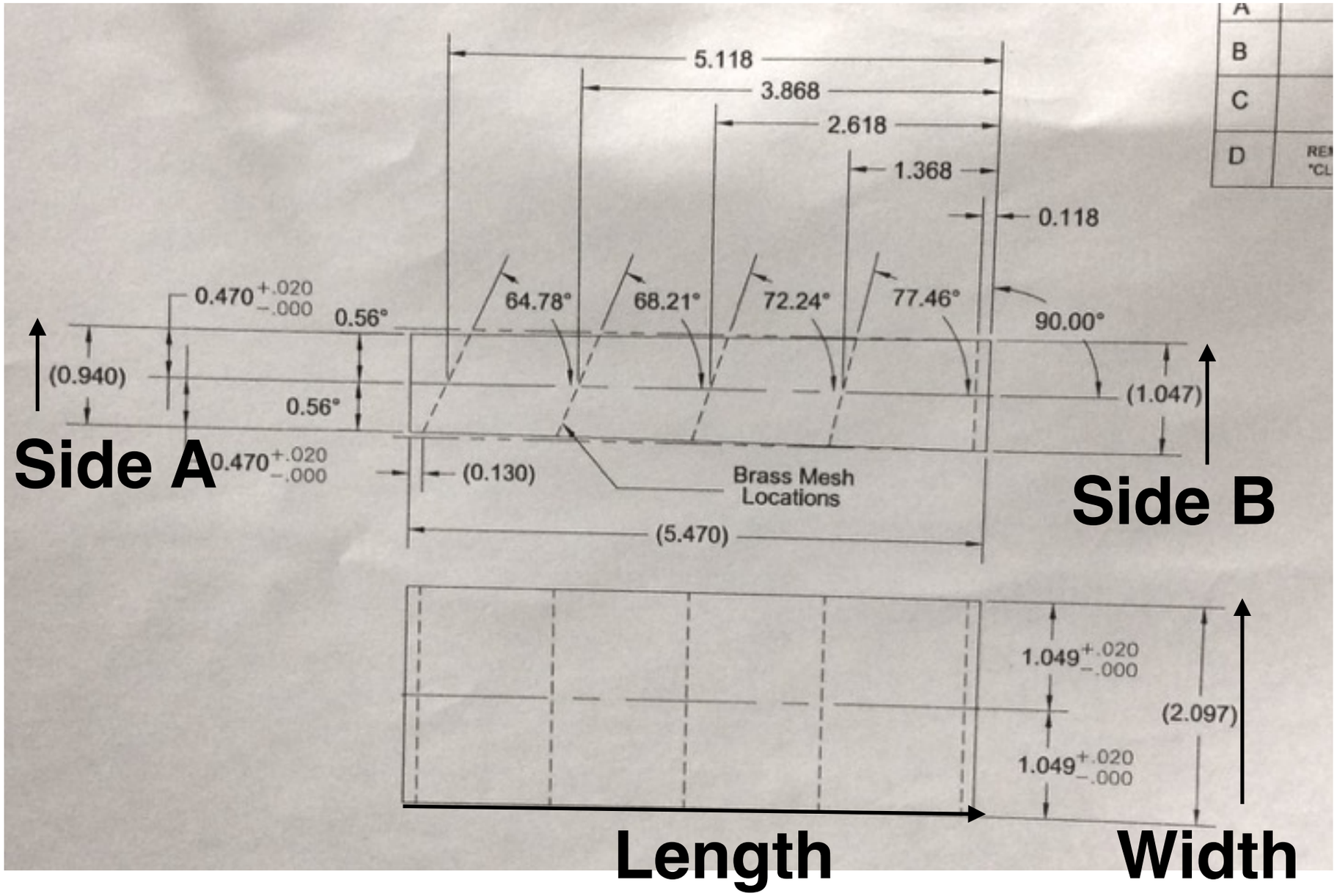
This happened starting from Module 8.

<u>Increasing Tungsten:</u>

In order to increase the amount Tungsten powder, we increase the time we shake the modules on the vibration table for roughly 5 minutes to 20 minutes.

This happened starting from Module 7.

Tolerance compliances



Side A (0.940 + 0.020in - 0.000in) Length (5.470 +0.020in -0.00in)

Side B (1.047 +0.020in - 0.000in) Width (2.097 +0.020in -0.000in)

Tolerance compliances

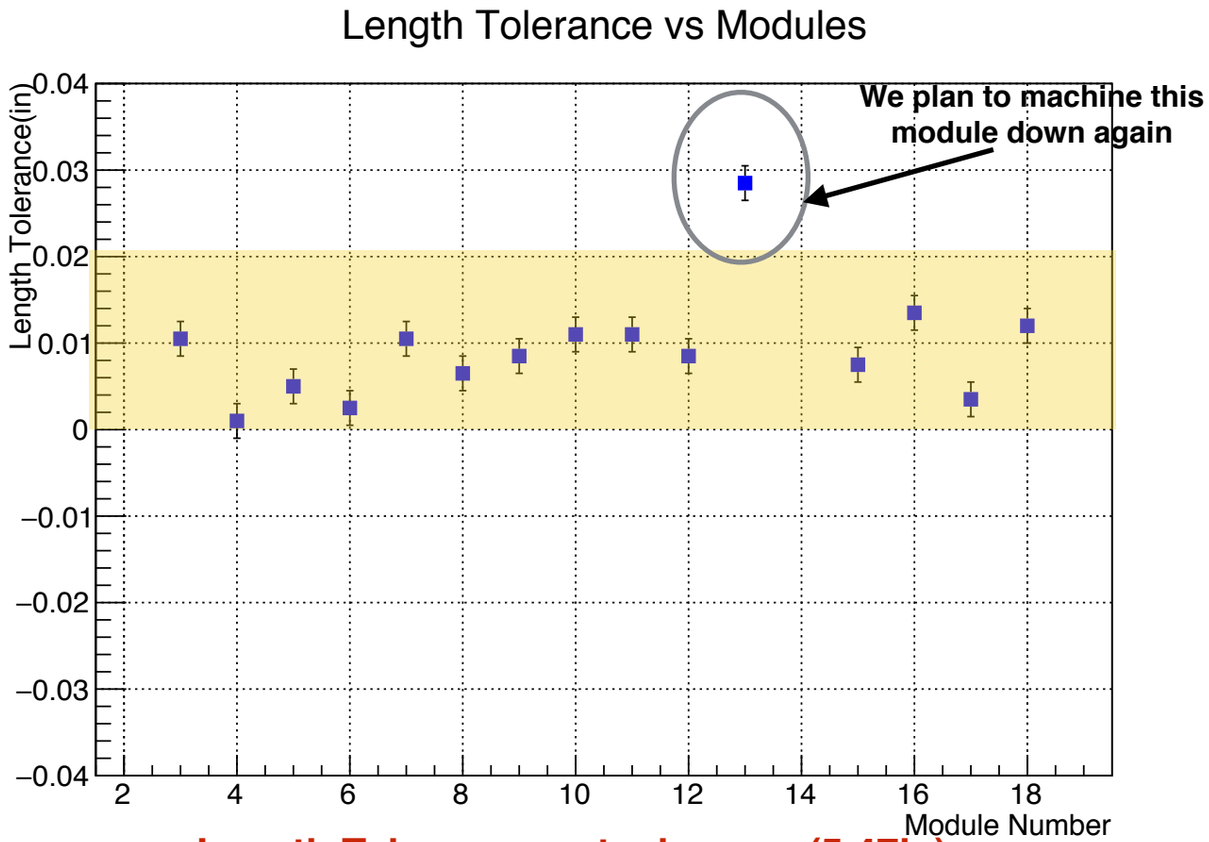
Module	Mass (g)	Length (inches)	width (inches)	Side B (inches)	Side A (inches)
3	1779	5.4805	2.1145	1.0562971	0.9582658
4	1762	5.469	2.1155	1.0539349	0.9562973
5	1746	5.467	2.105	1.055116	0.9559036
6	1749	5.4725	2.112	1.0519664	0.9570847
7	1795	5.4805	2.11	1.0566908	0.956691
8	1795	5.4765	2.108	1.0555097	0.9590532
9	1802	5.4785	2.104	1.0527538	0.9555099
10	1766	5.4810	2.1085	1.0523601	0.9535414
11	1787	5.4810	2.1175	1.0464546	0.952754
12	1776	5.5005	2.1195	1.0555097	0.9555099
13	1805	5.5105	2.12	1.0566908	0.9551162
15	1774	5.484	2.117	1.0555097	0.952754
16	1778	5.4835	2.1125	1.0559034	0.9590532
17	1830.5	5.4735	2.1145	1.0594467	0.9599980
18	1793.5	5.482	2.11	1.0559034	0.952754

uncertainties:

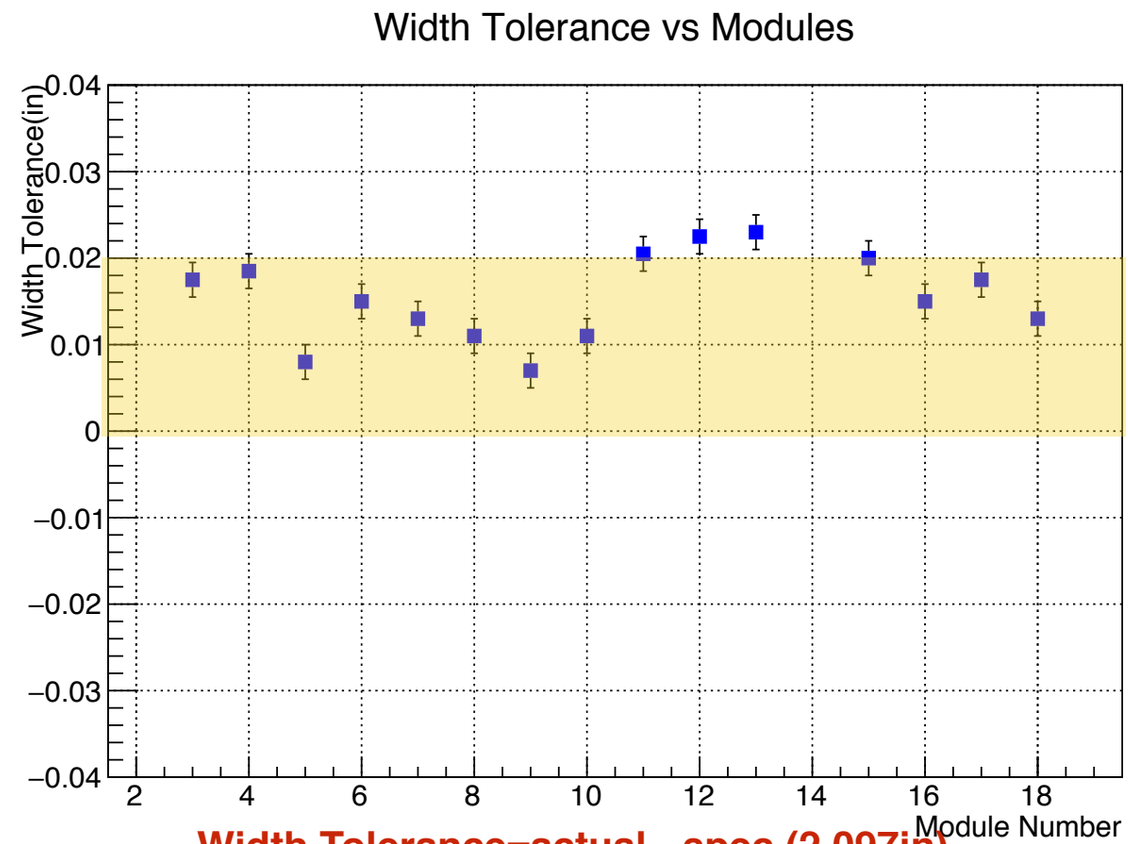
mass: +/-0.05g

length,width,sideA,side B: +/-0.002in

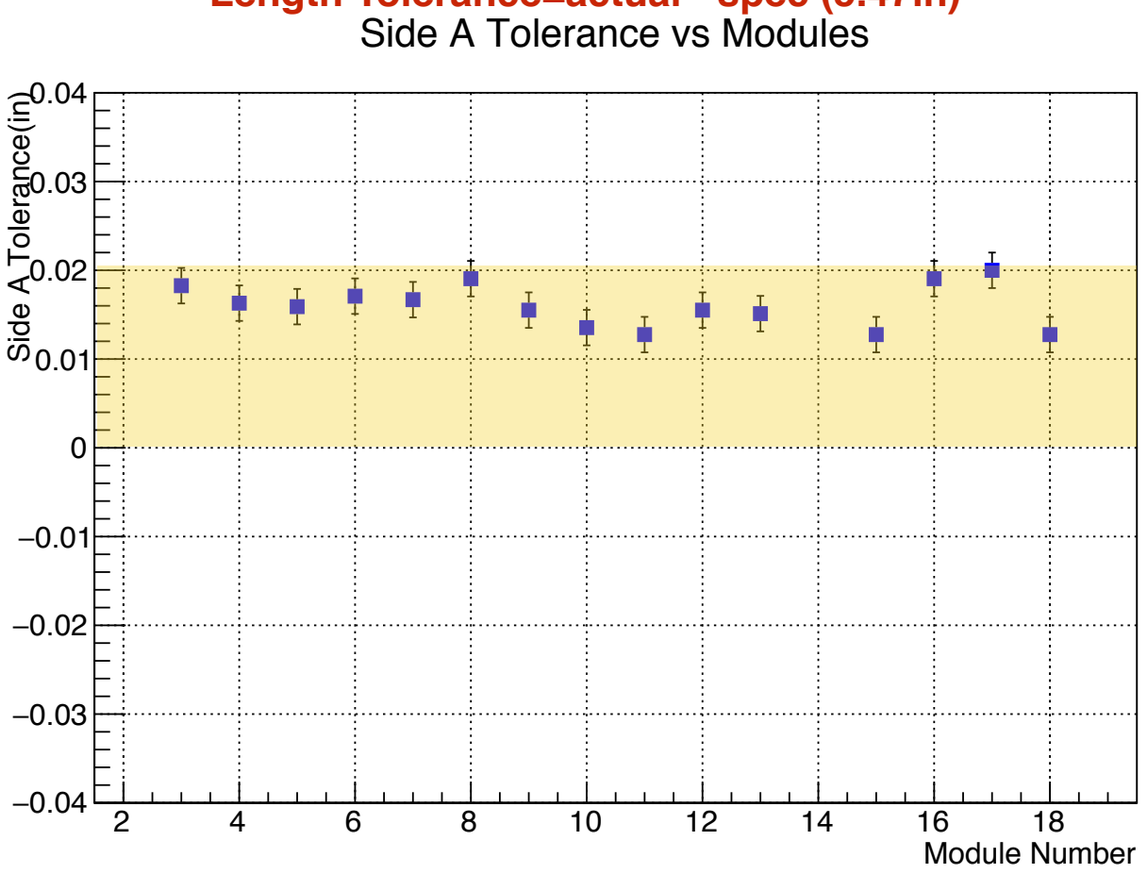
Tolerances vs Module Number



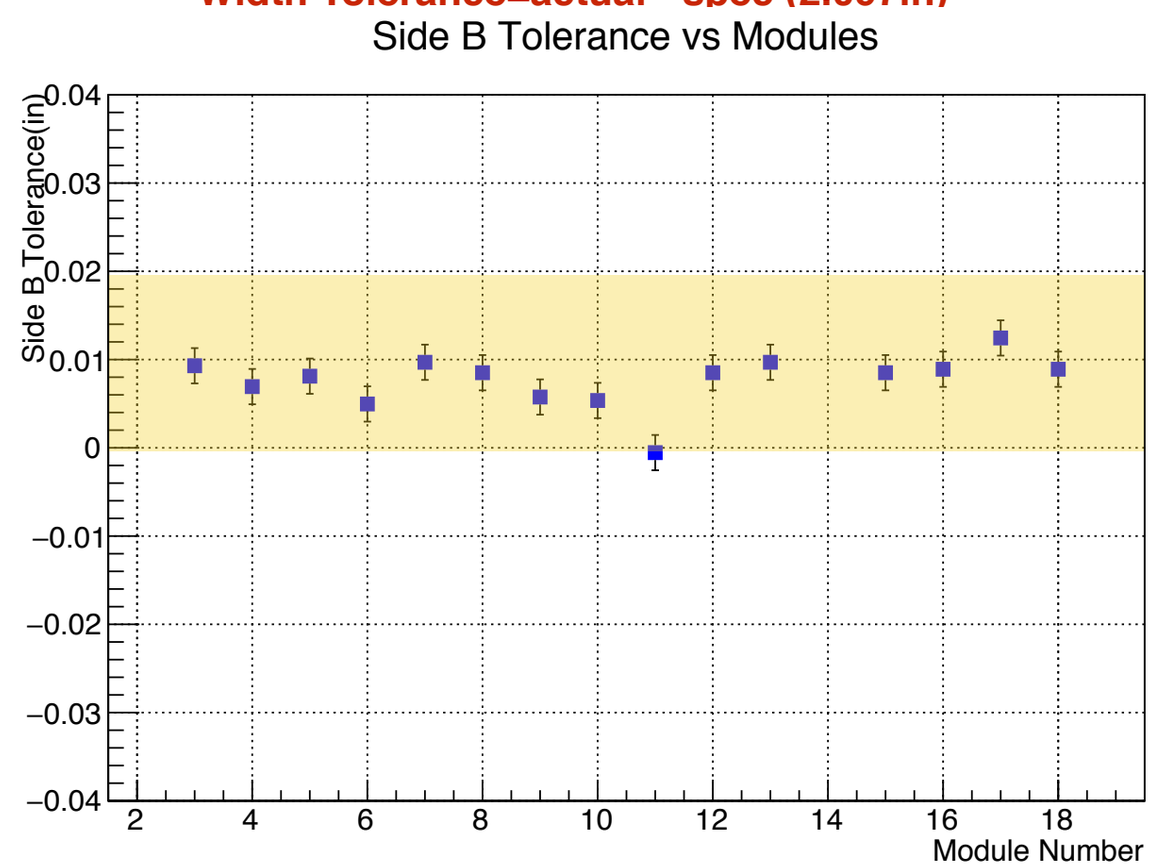
Length Tolerance=actual - spec (5.47in)



Width Tolerance=actual - spec (2.097in)

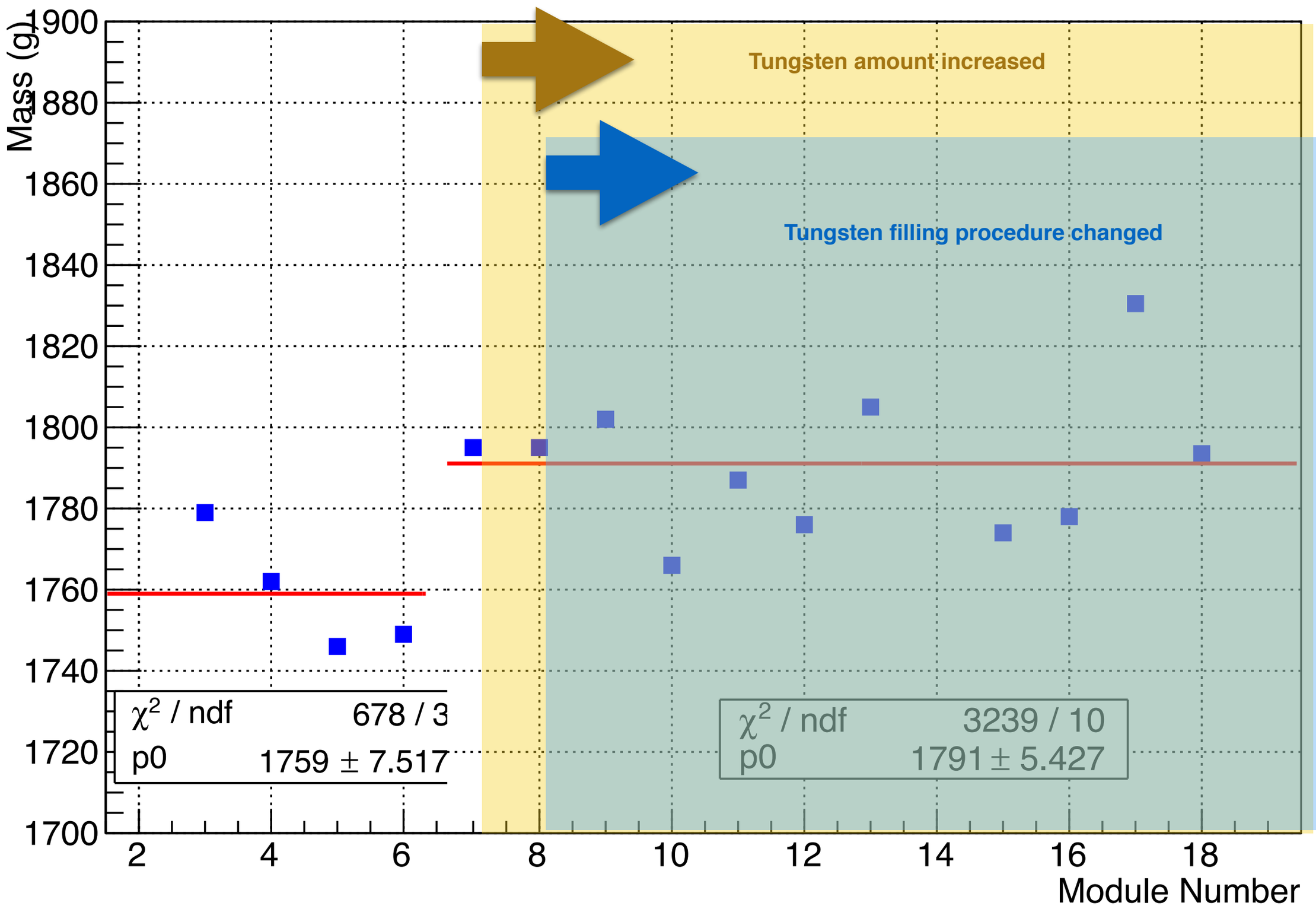


Side A Tolerance=actual - spec (0.94in)

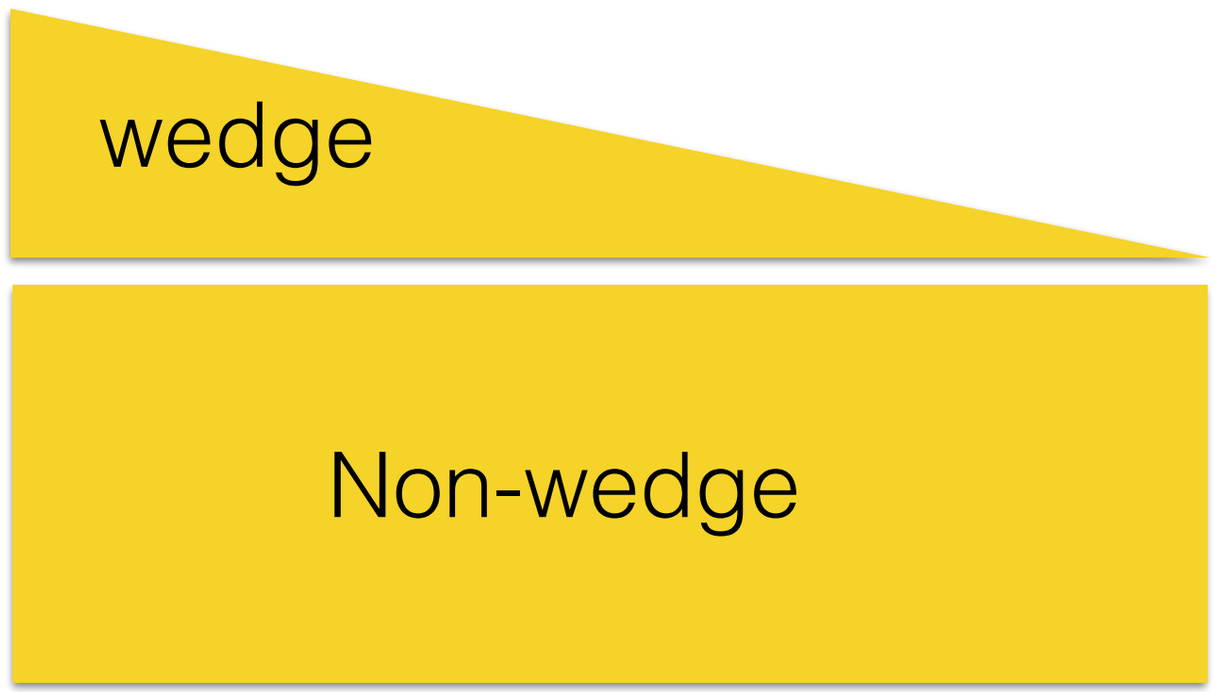


Side B Tolerance=actual - spec (1.047in)

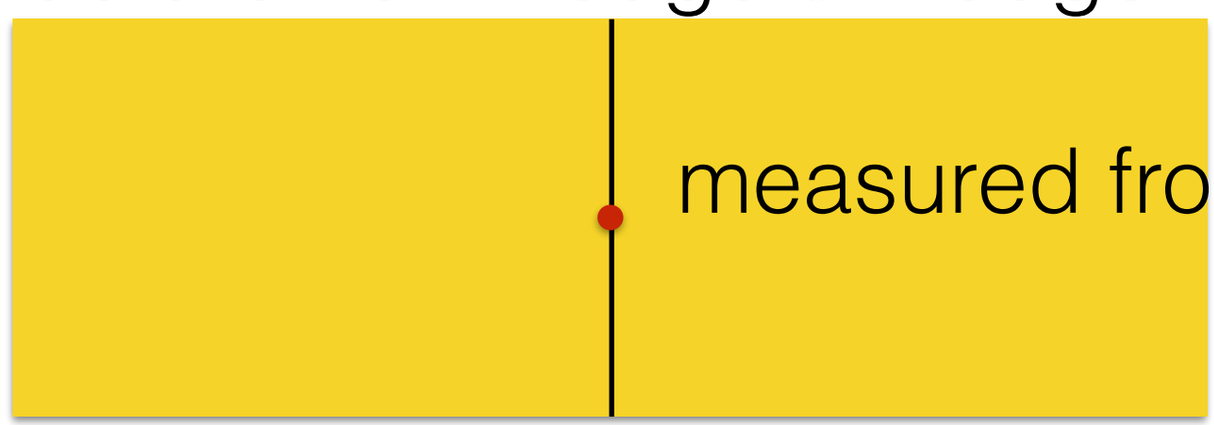
Mass vs Modules



Density Methods:

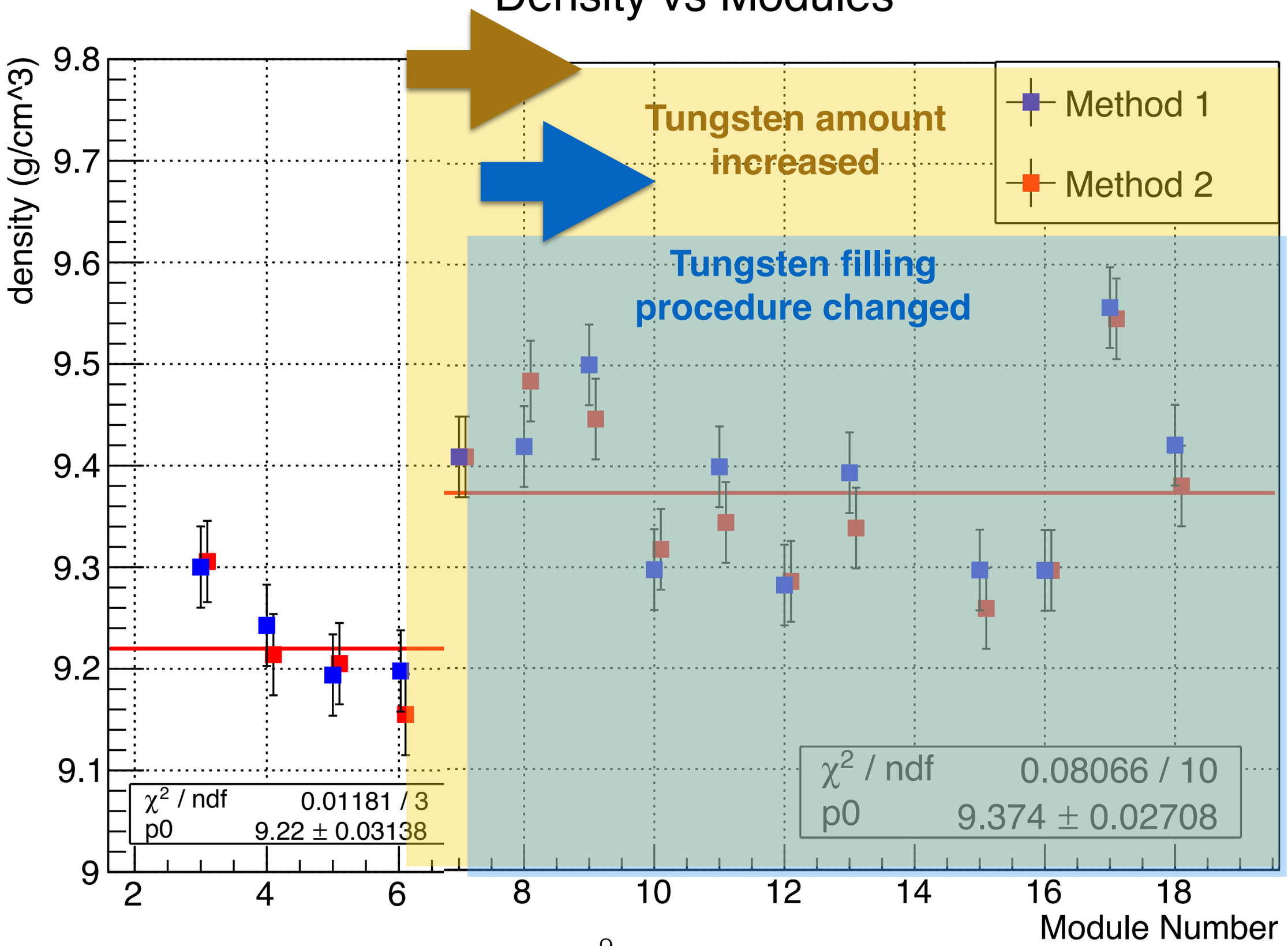


Method 1: add the non-wedge & wedge volumes together



Method 2: cross sectional area times length

Density vs Modules



Summary

- For the tolerance compliance, module 13 was outside the tolerance, but this will be further machined down.

- In comparing the average densities between method 1 and method 2, we find that both methods are quantitatively comparable.

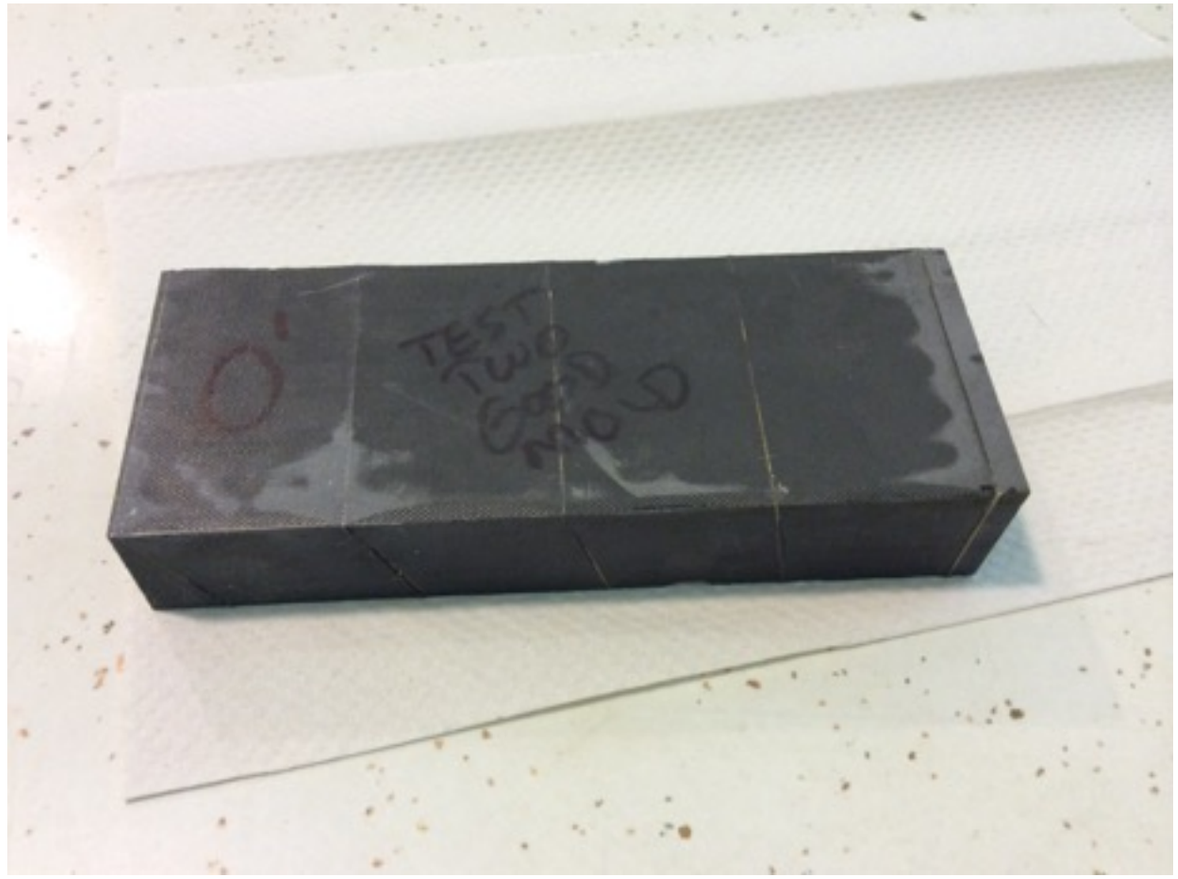
- We have shipped the following modules to BNL:

  - Module #: 3,4,5,8,9,11,15,16,17,18

Pictures of all modules

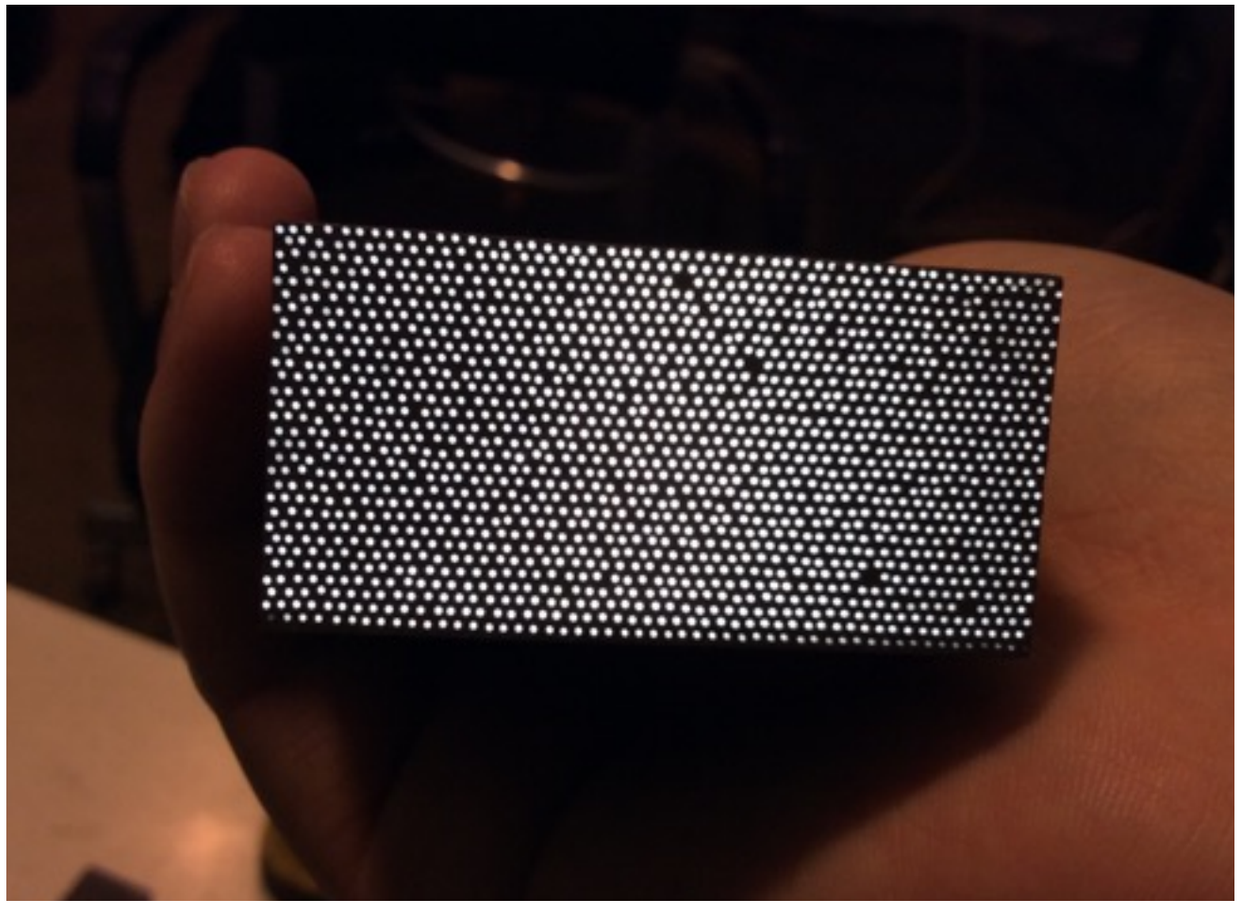
Modules 0’ to 18

Module 0’

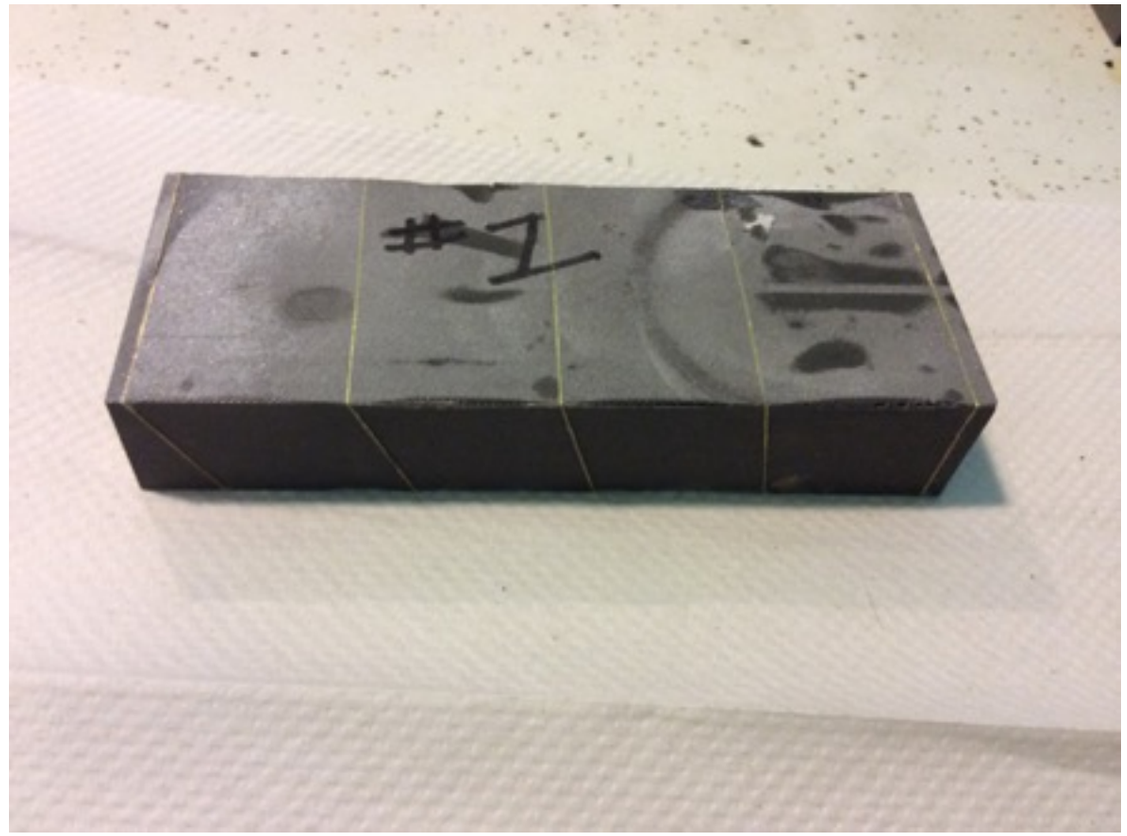


narrow end

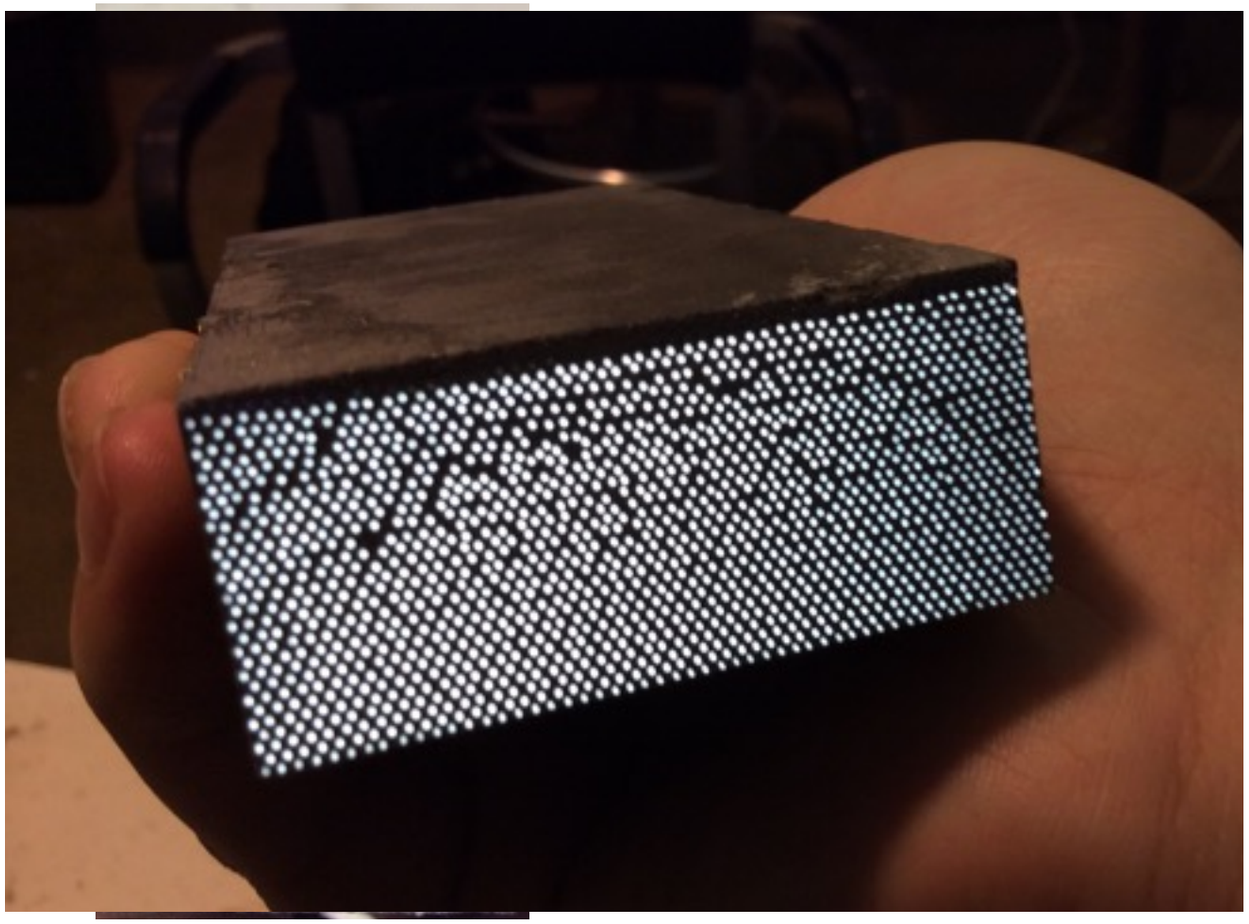
wide end



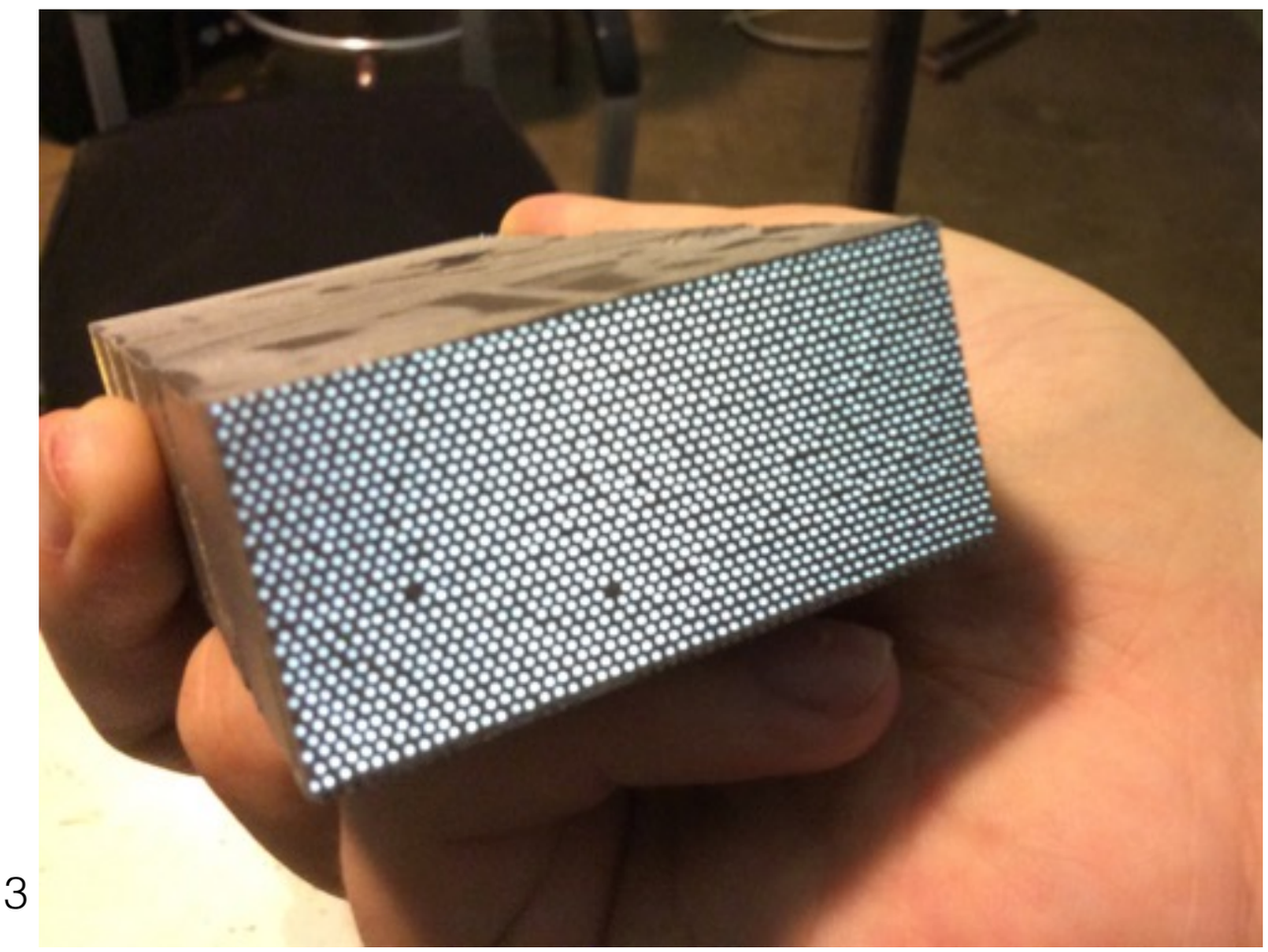
Module 1



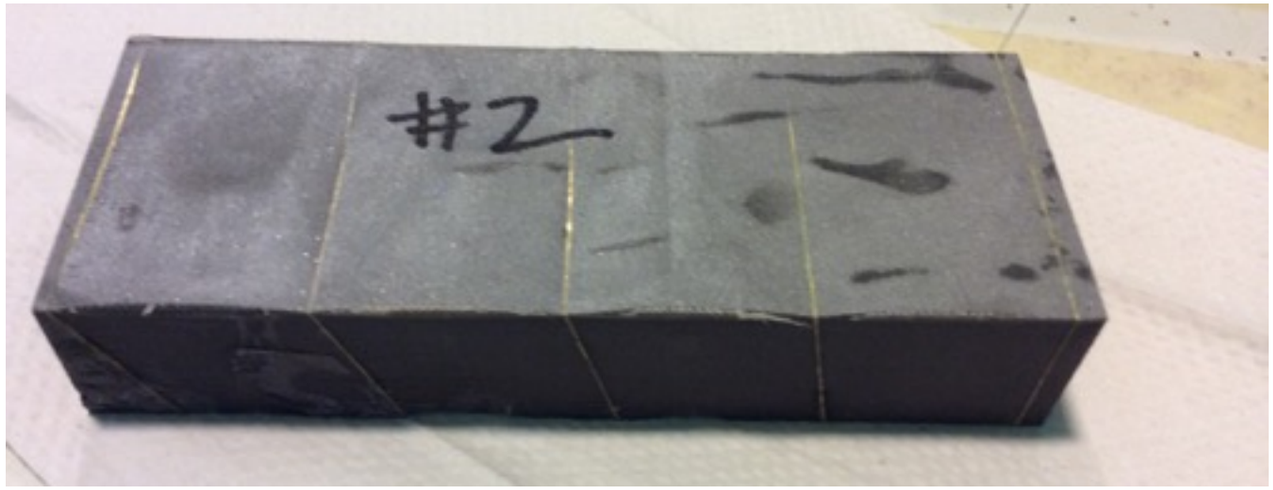
narrow end



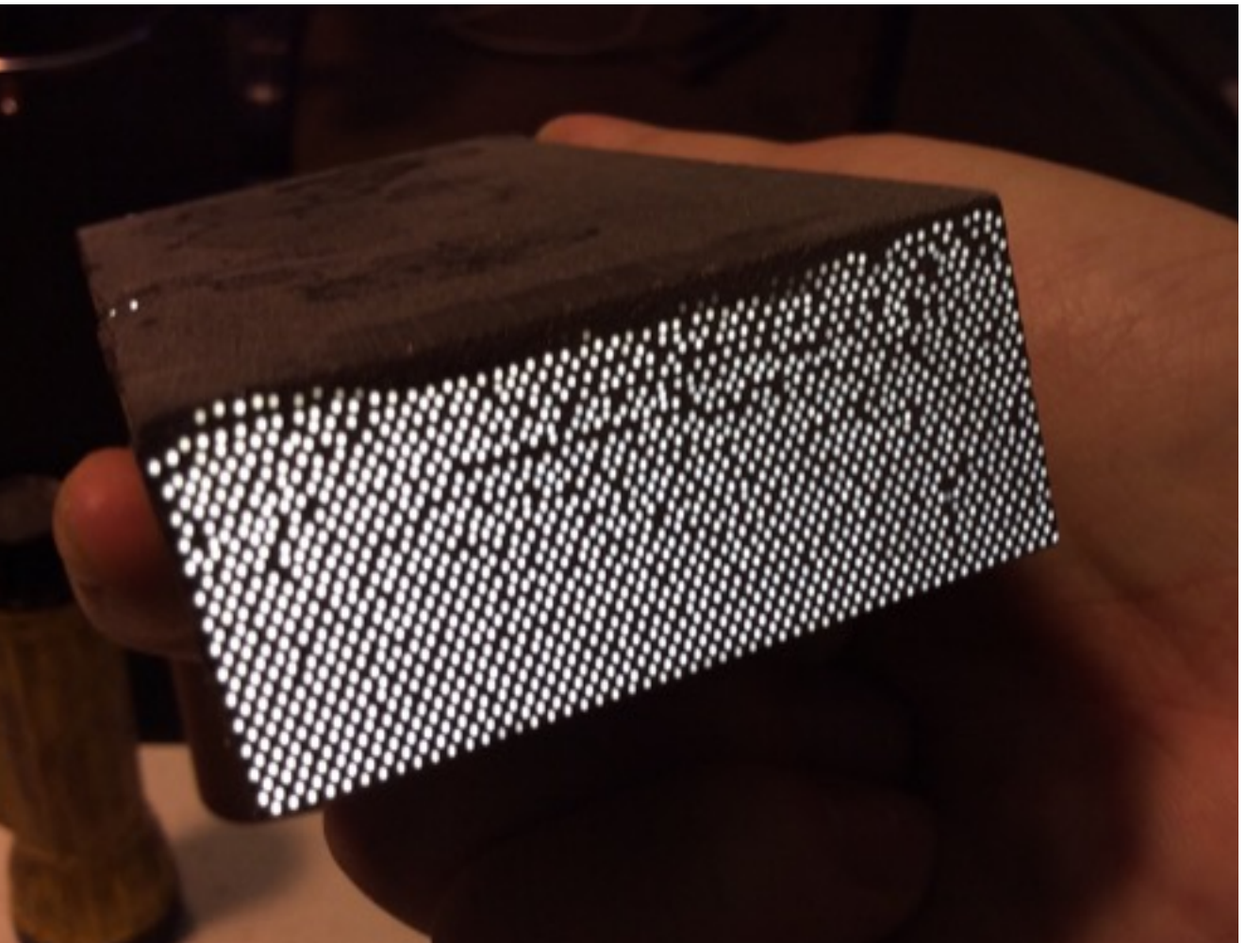
wide end



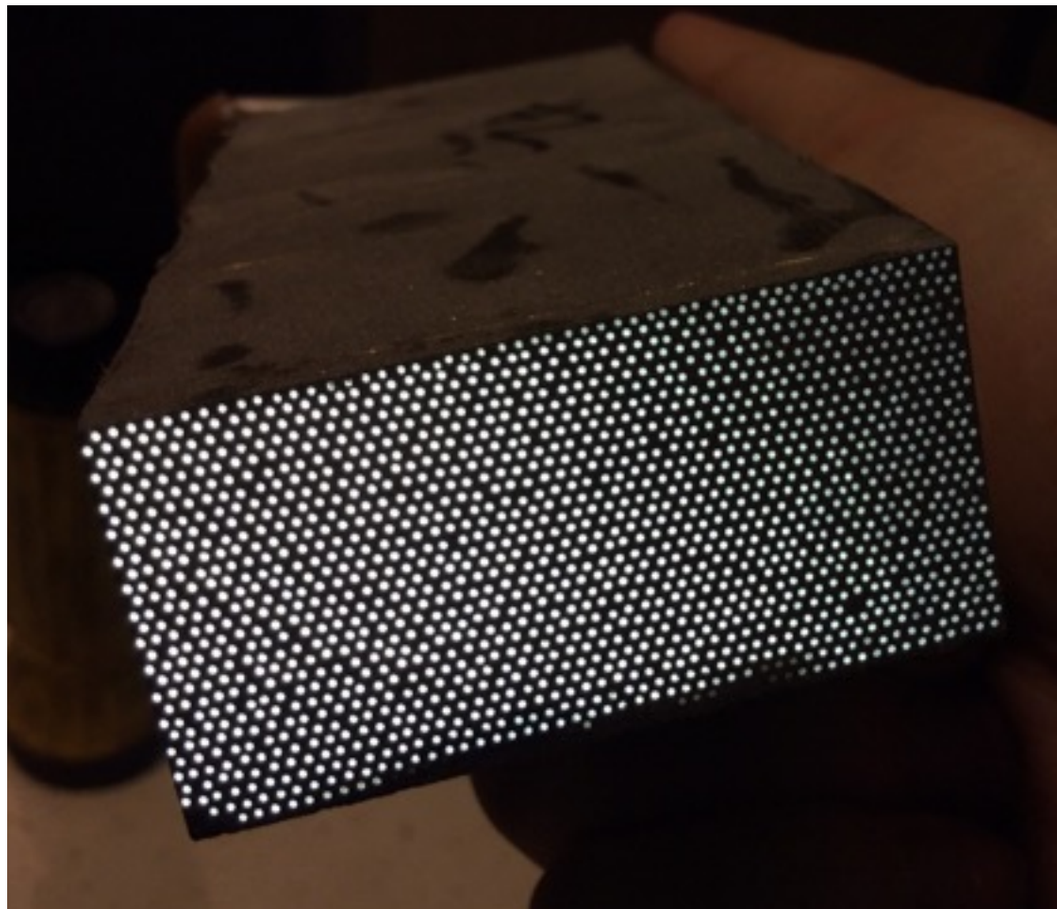
Module 2



narrow end



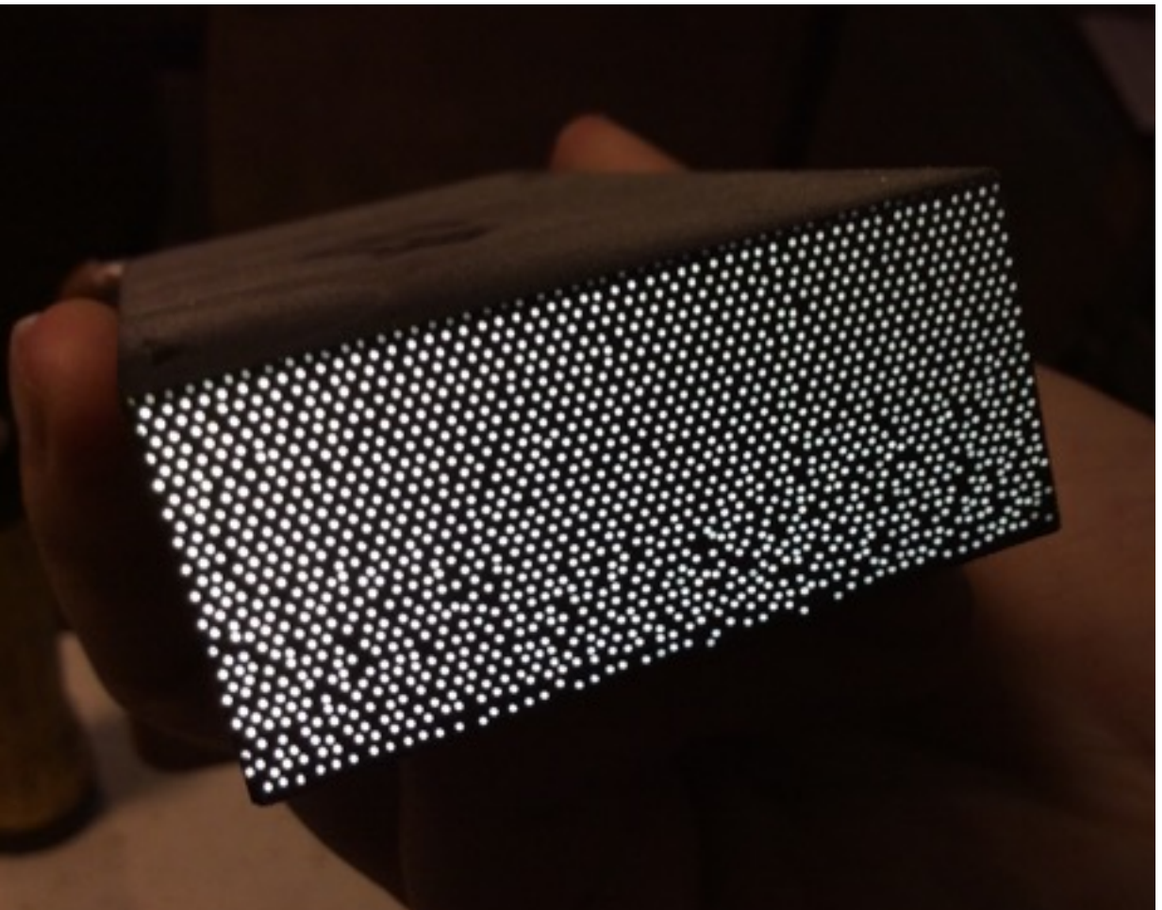
wide end



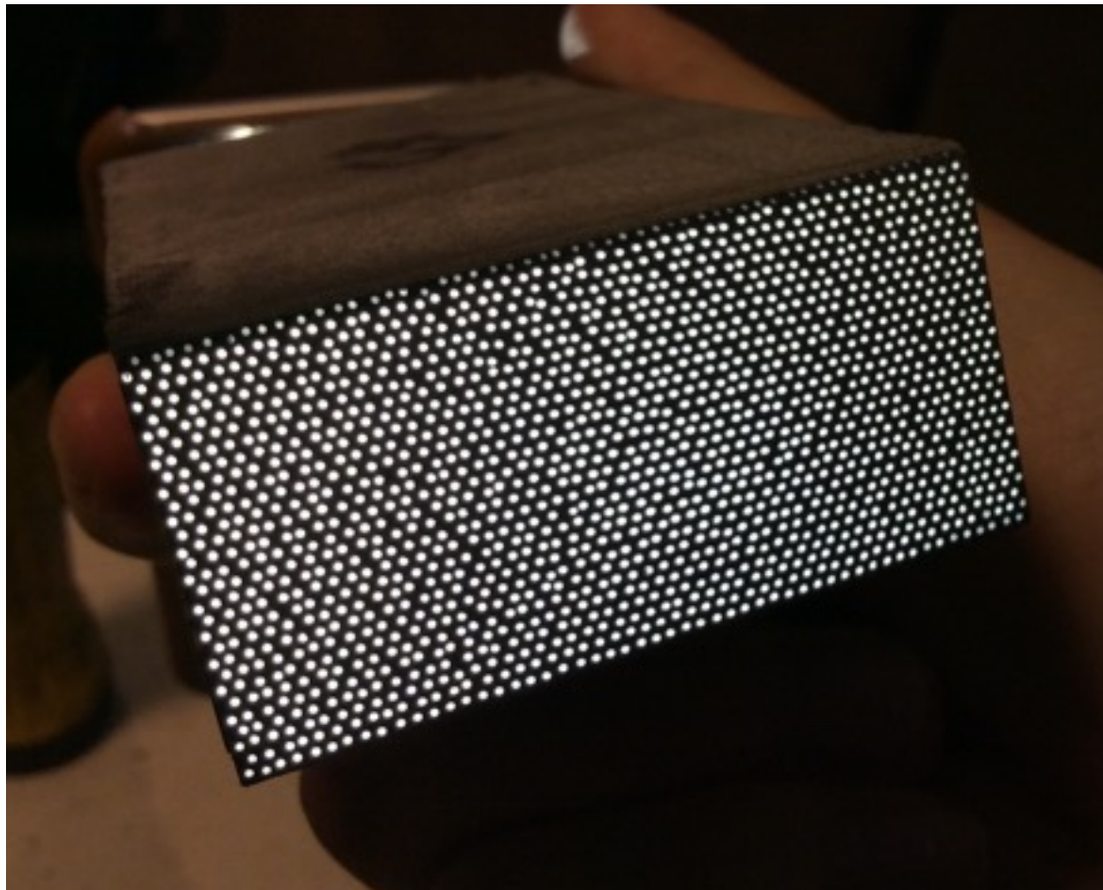
Shipped to BNL

Module 3

narrow end



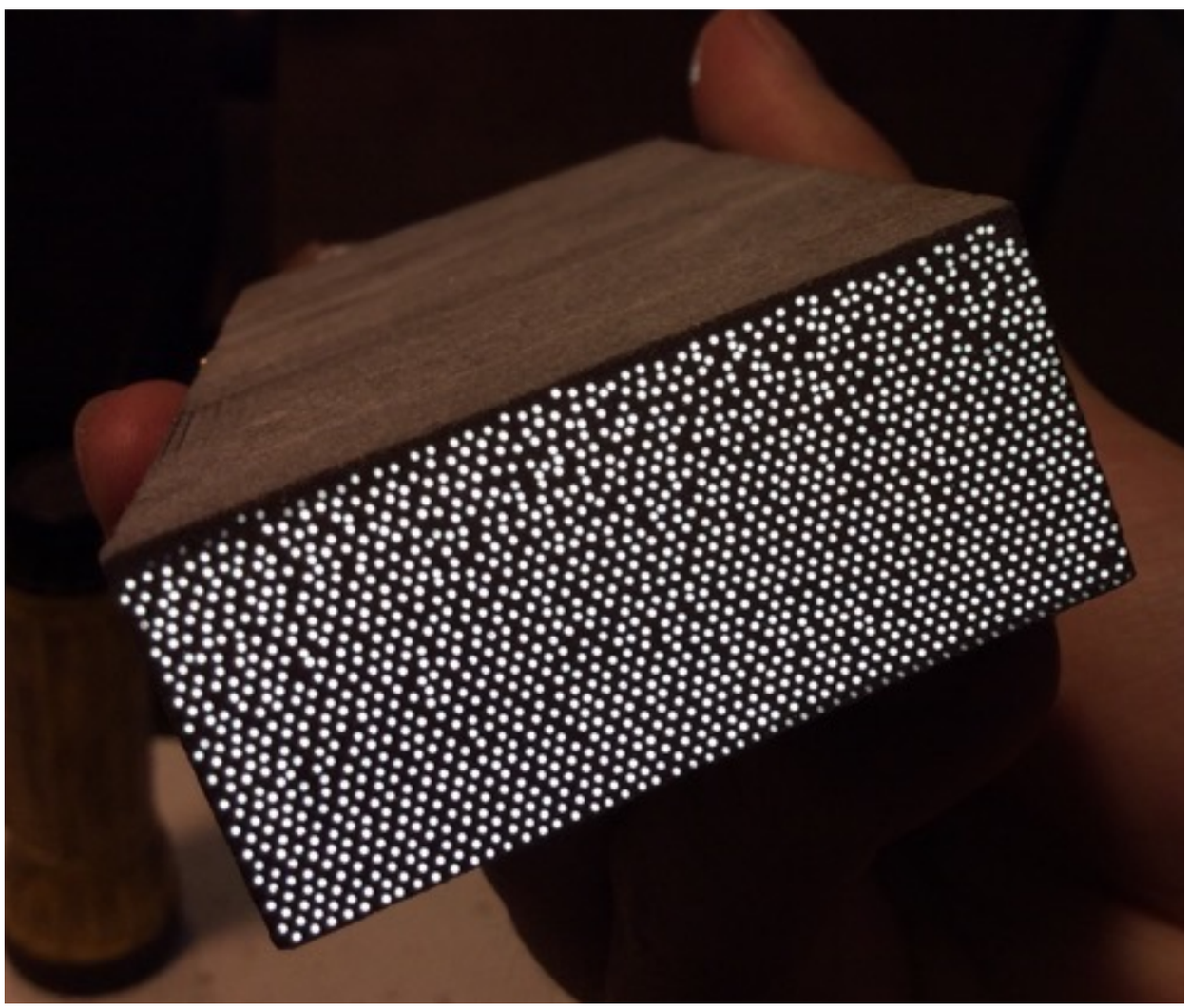
wide end



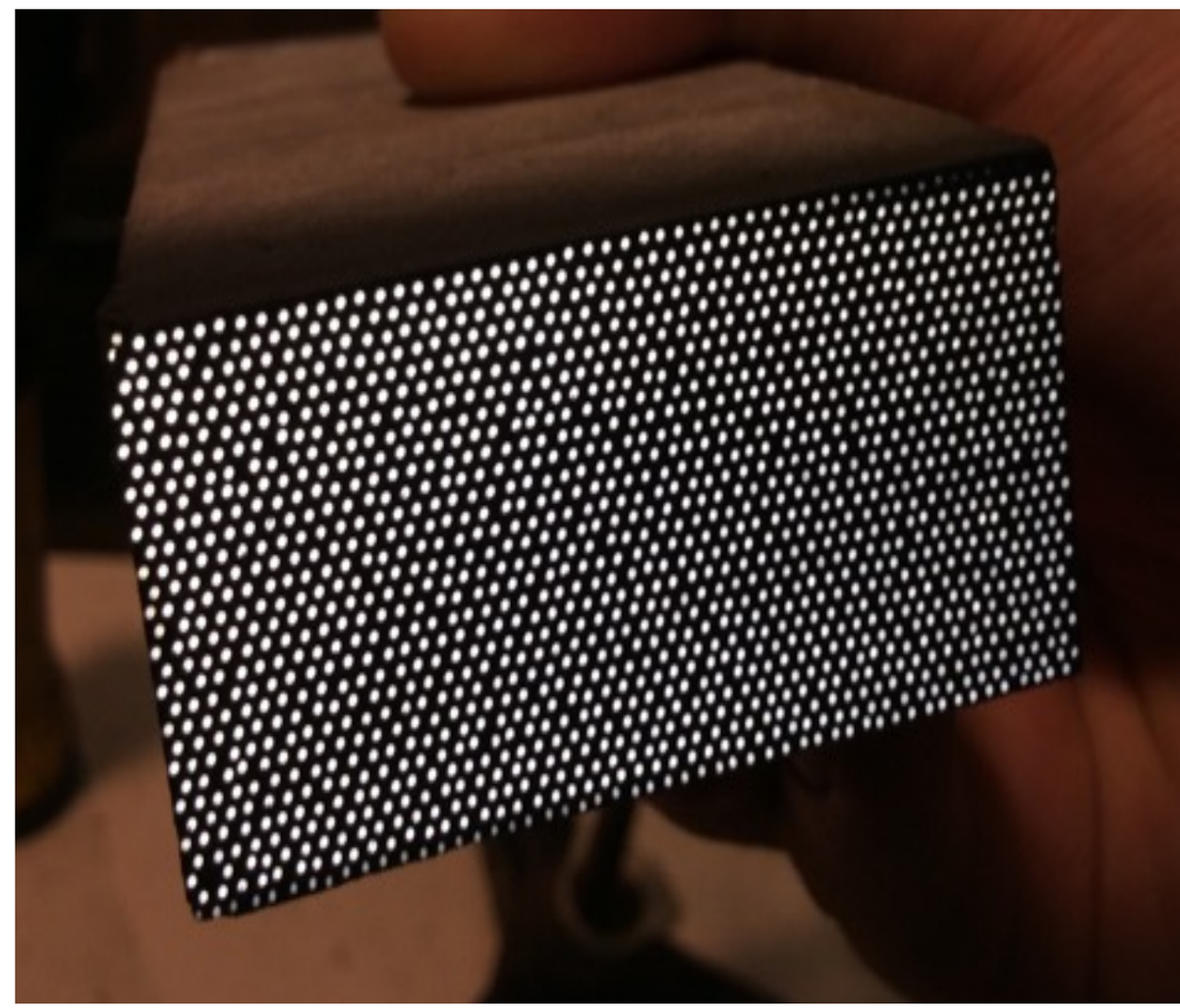
Module 4

Shipped to BNL

narrow end



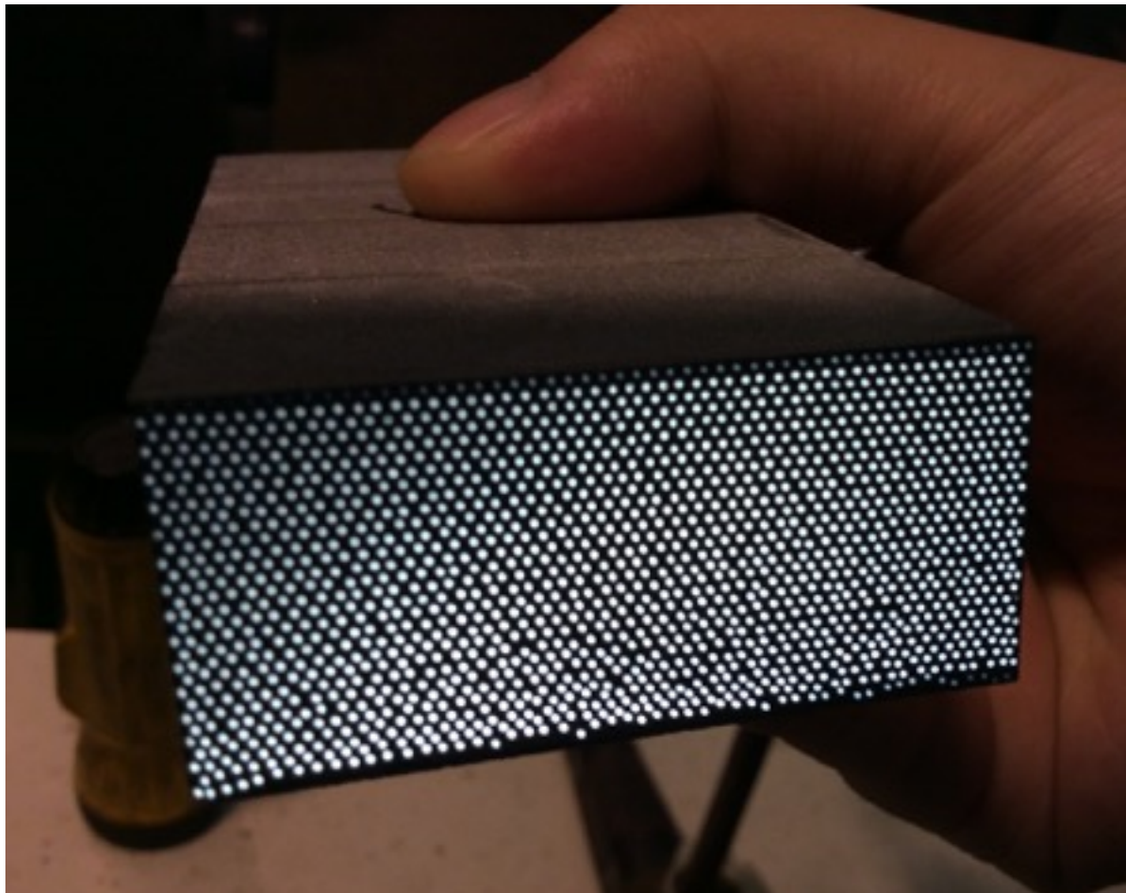
wide end



Module 5

Shipped to BNL

narrow end



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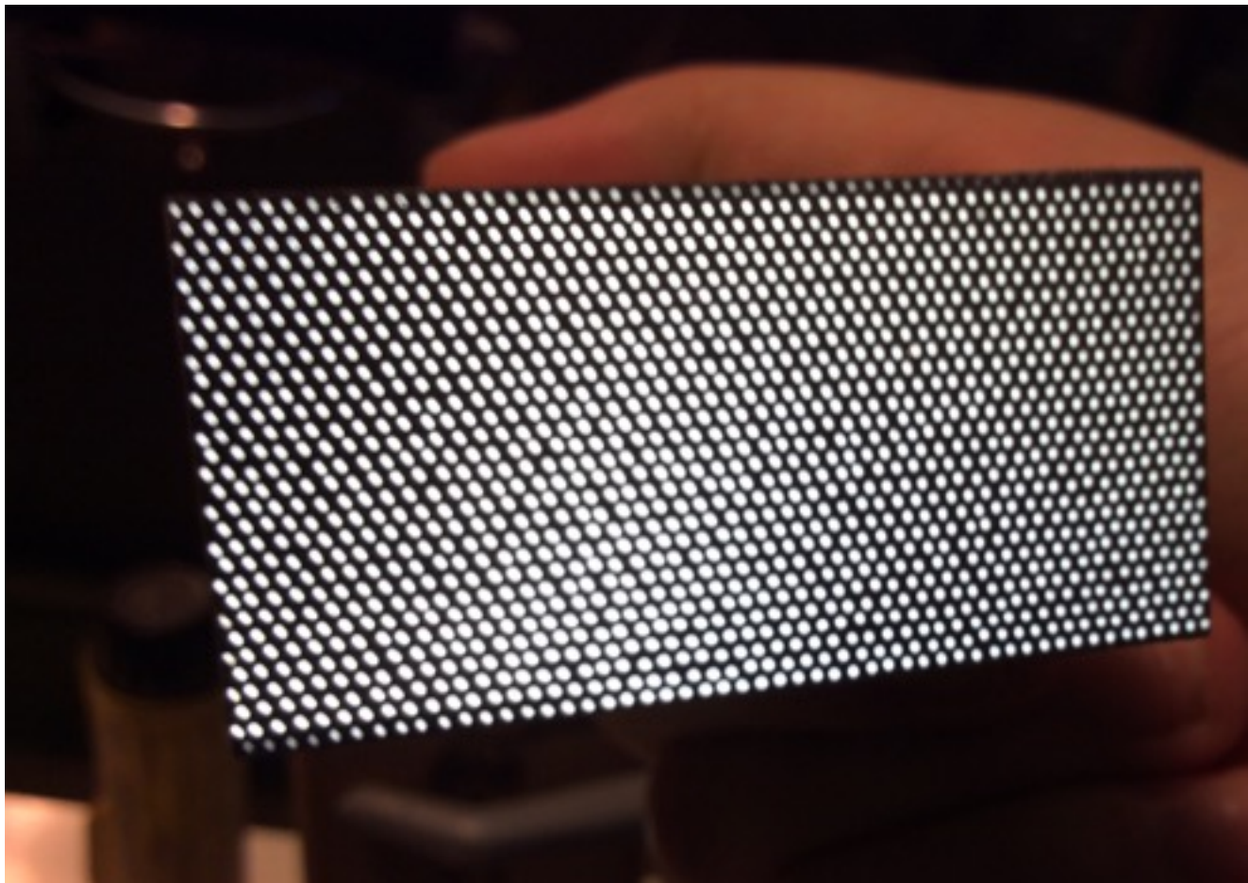
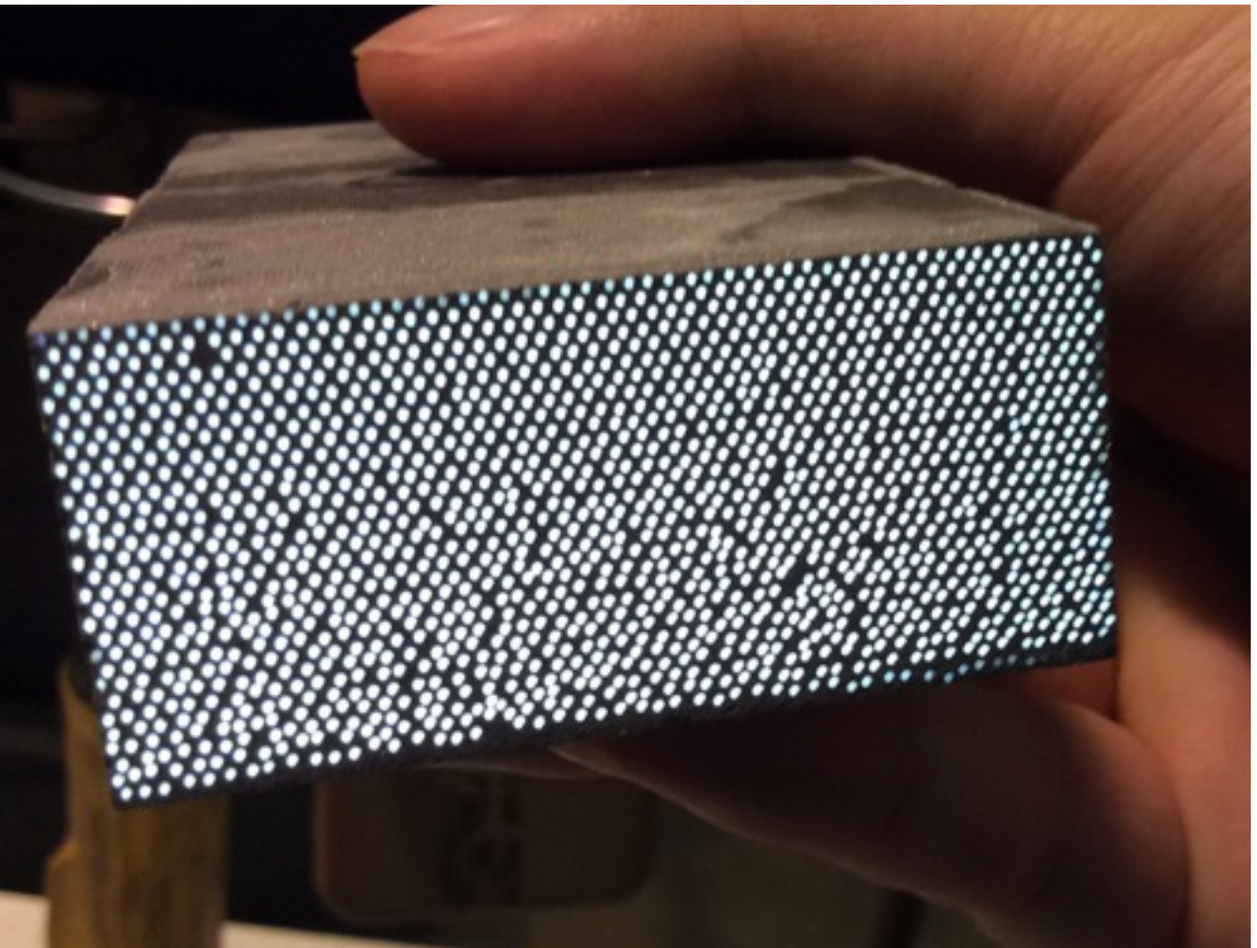
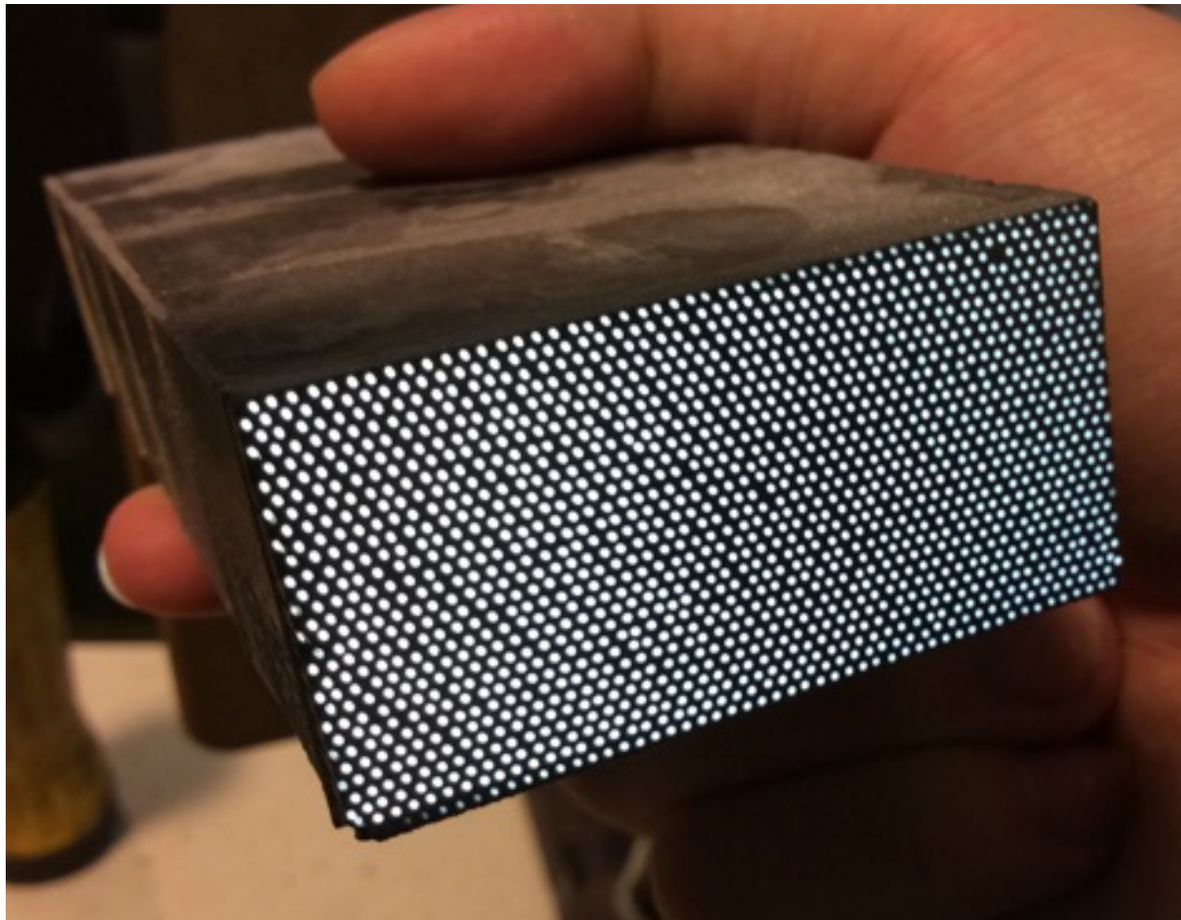


Module 6

narrow end

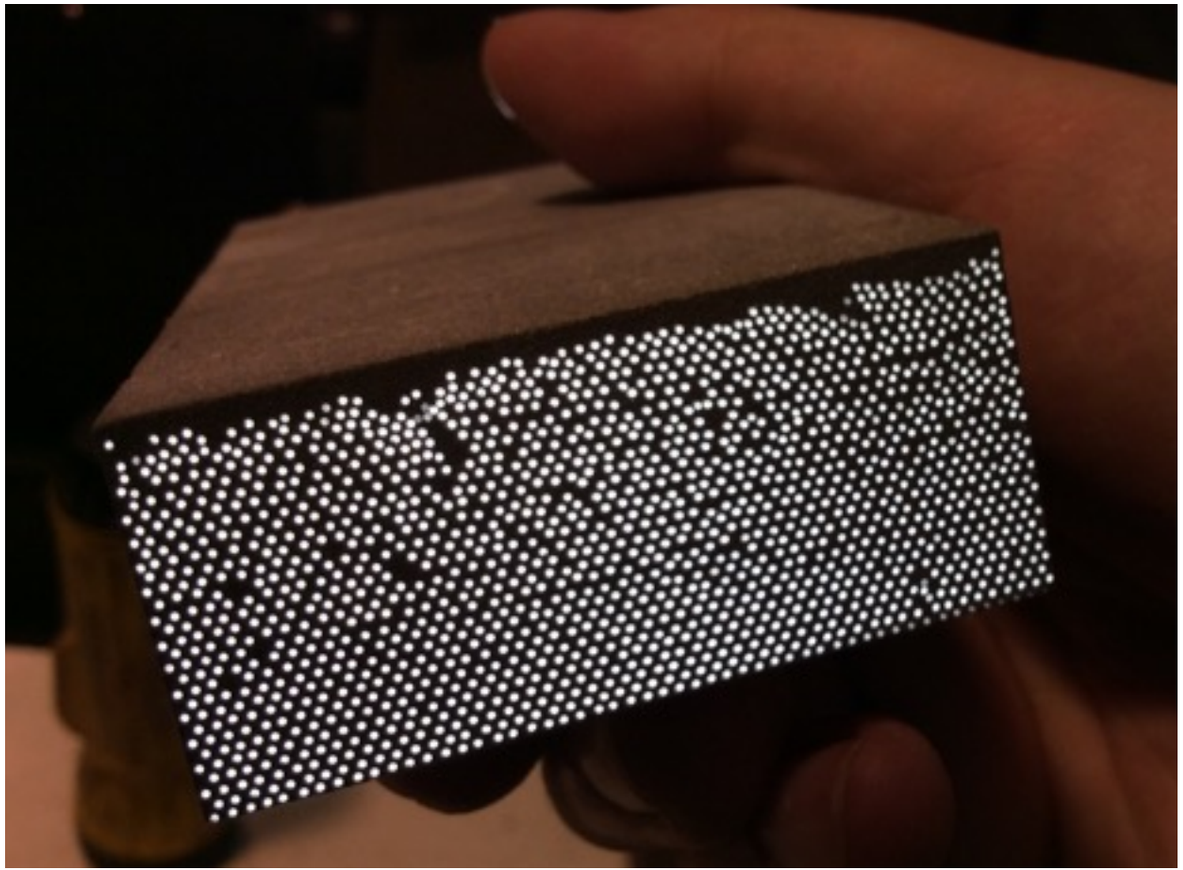


wide end

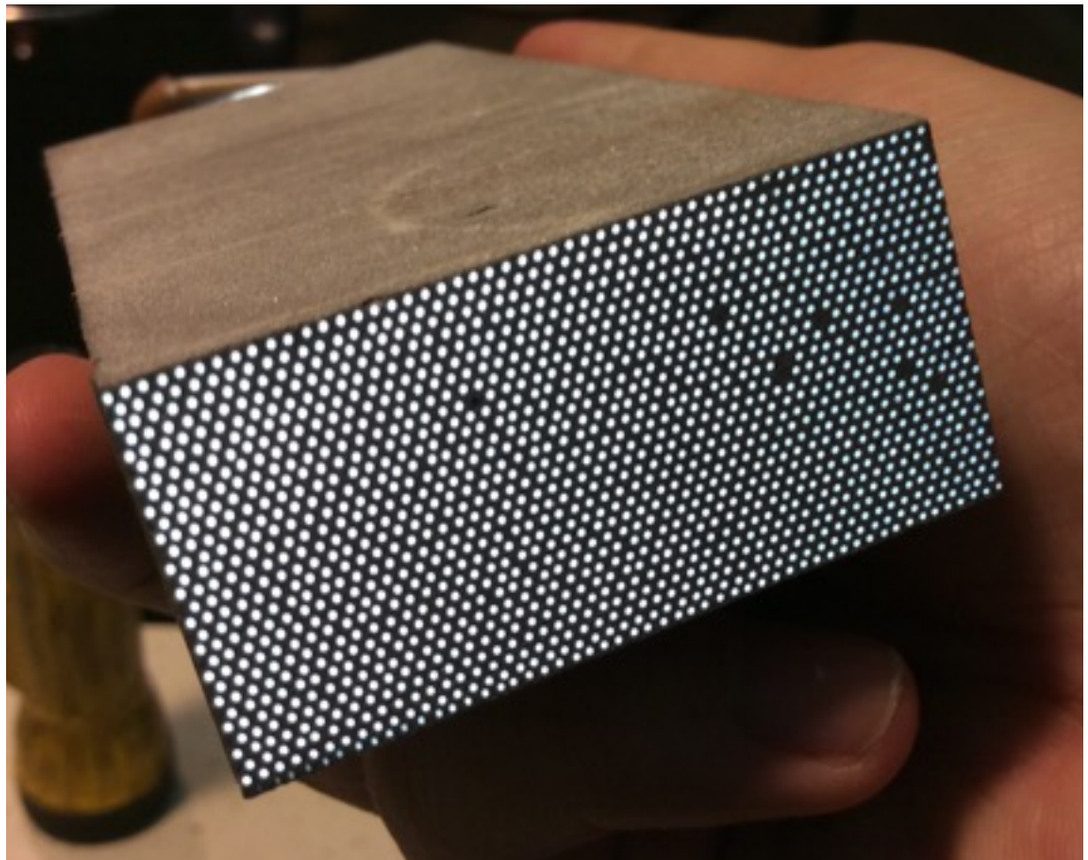


Module 7

narrow end



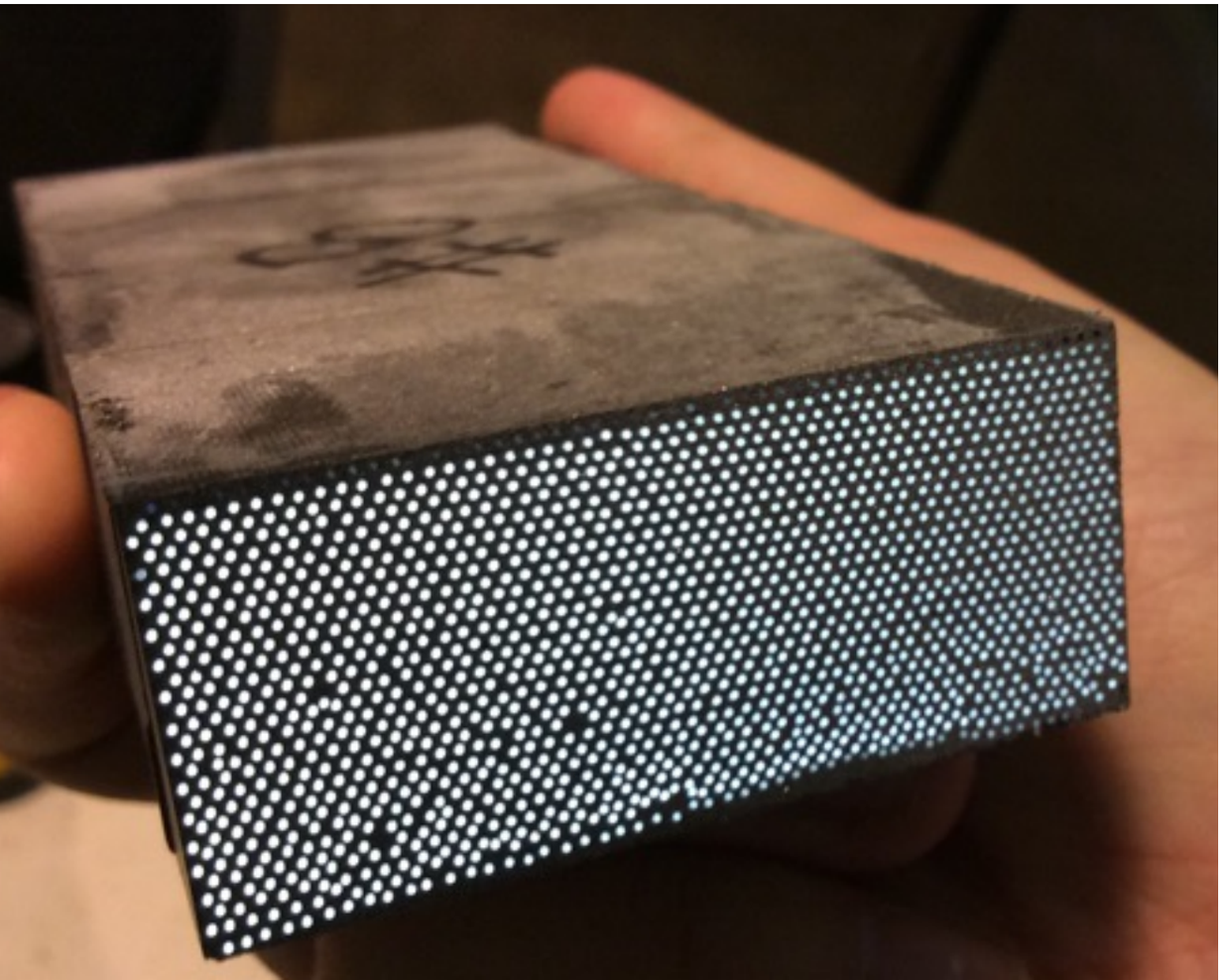
wide end



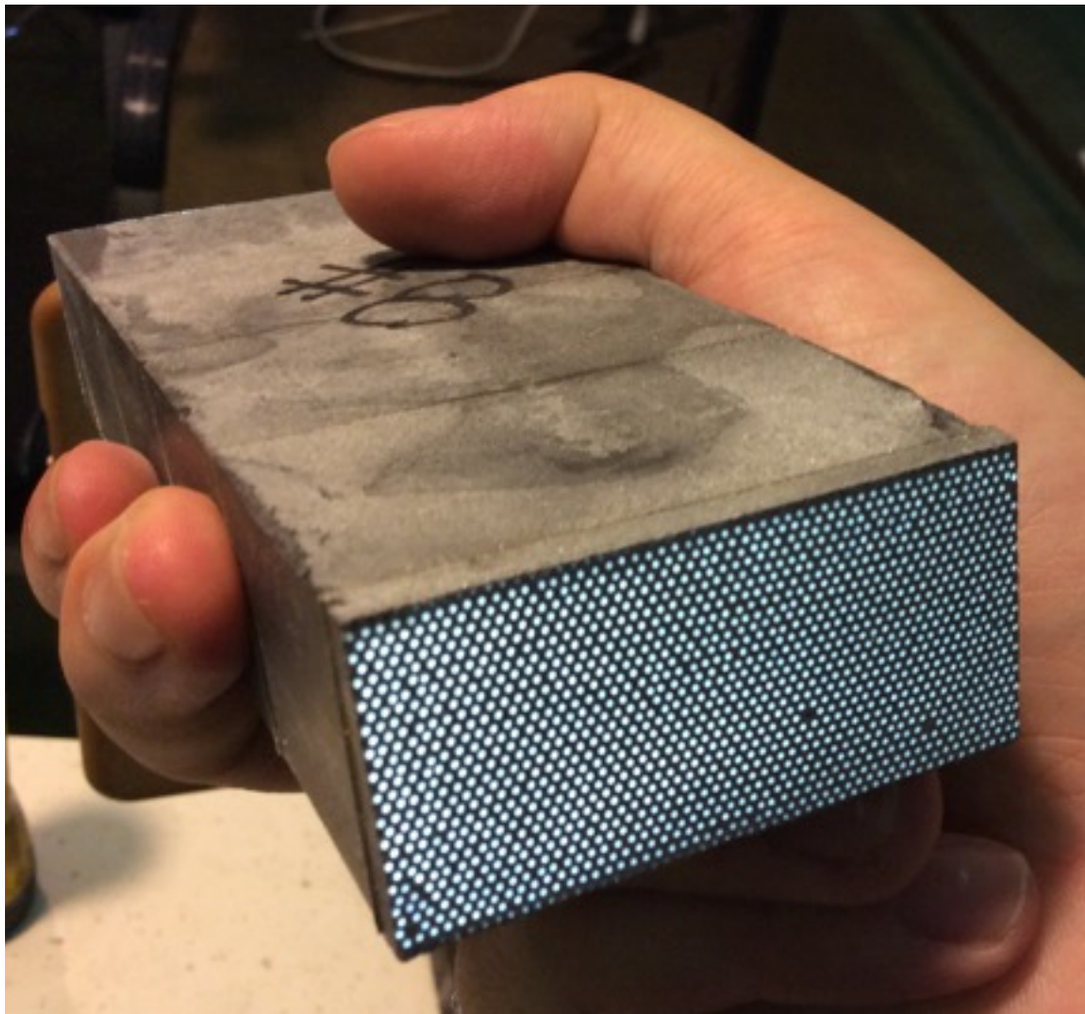
Module 8

Shipped to BNL

narrow end



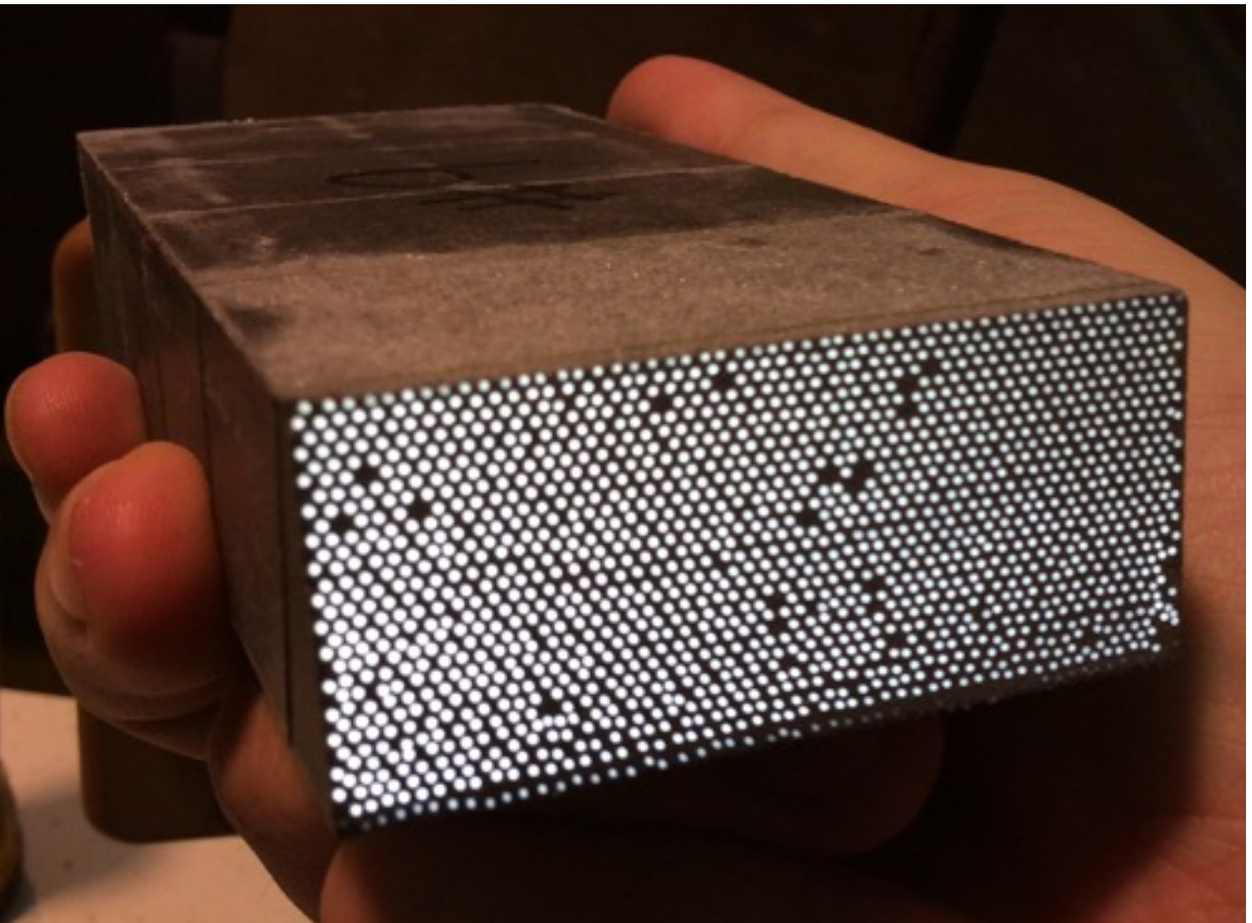
wide end



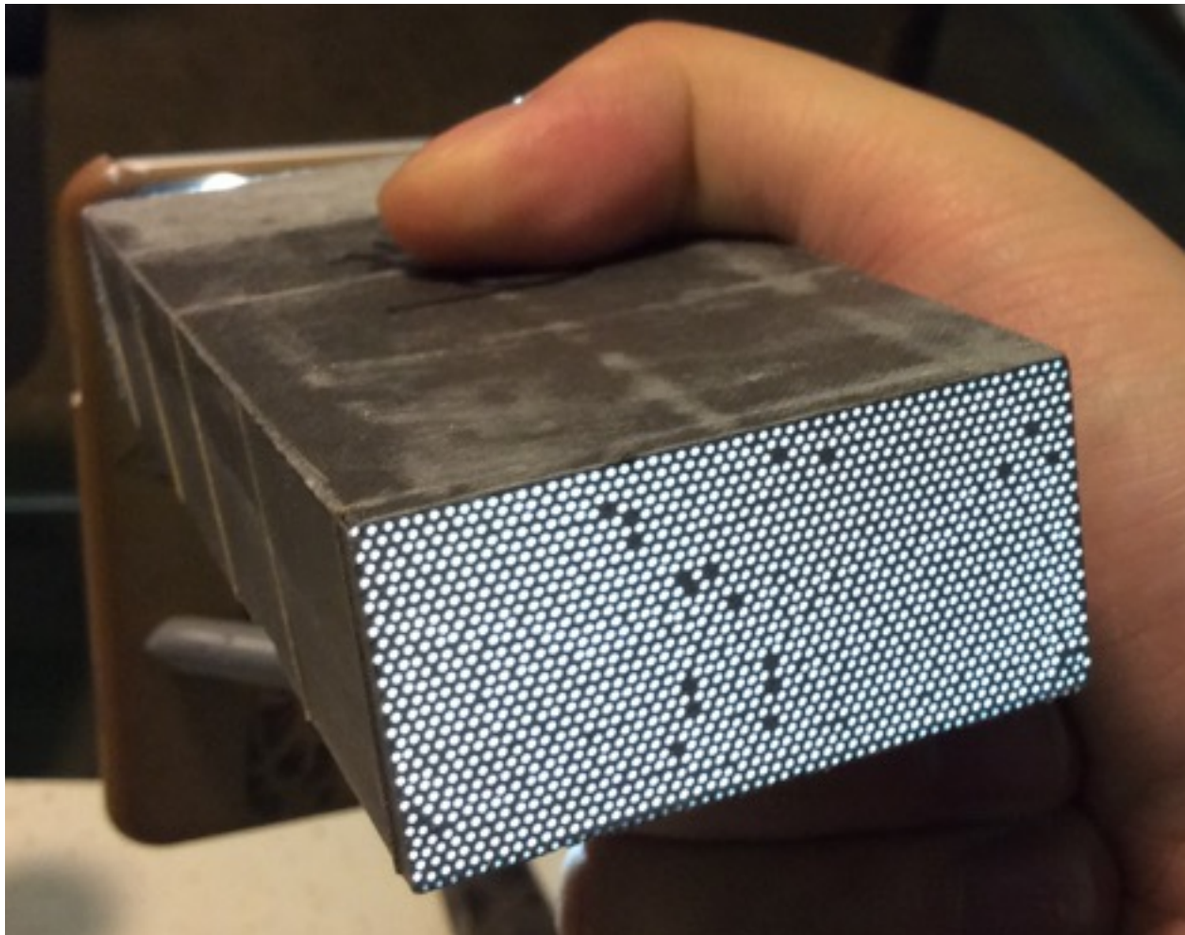
Module 9

Shipped to BNL

narrow end



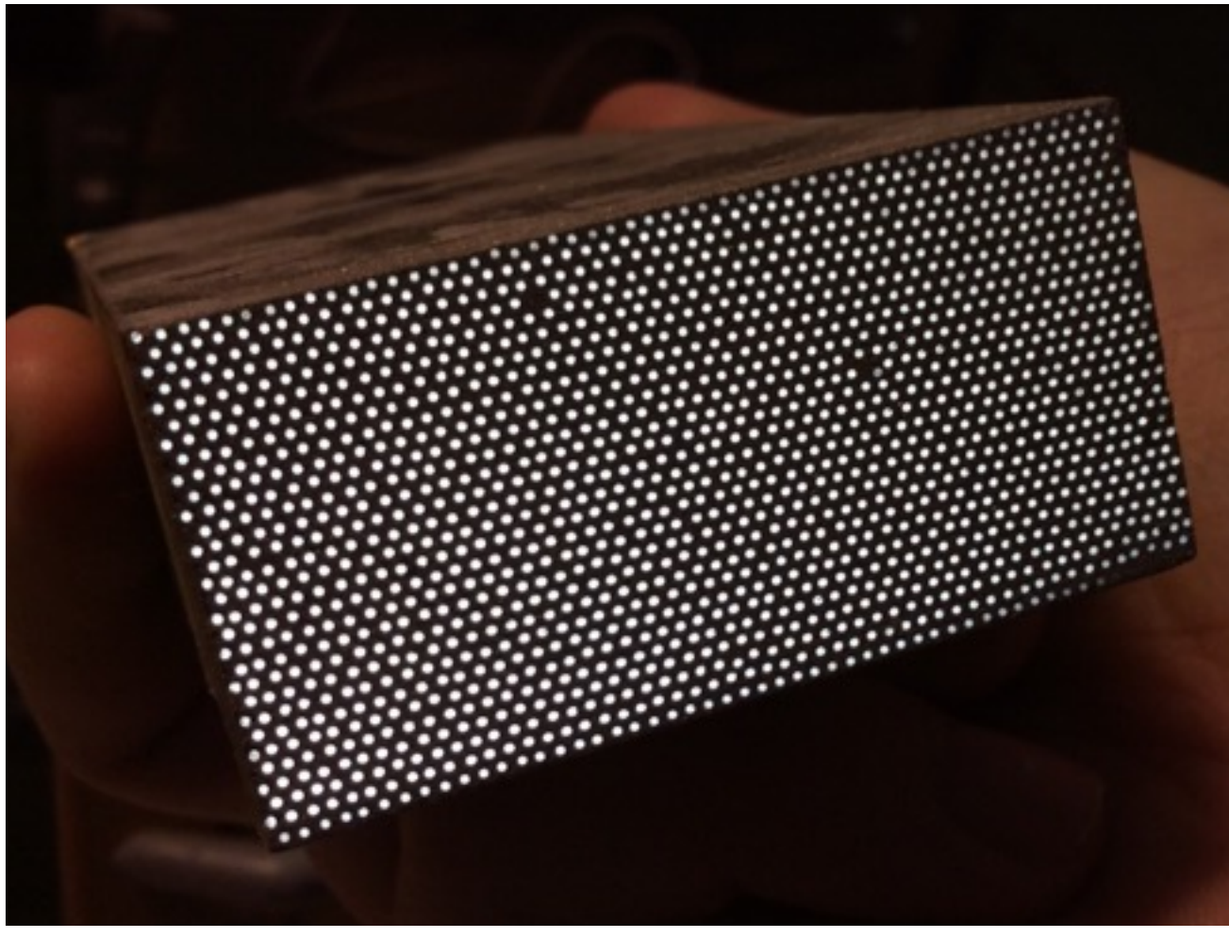
wide end



Module 10

narrow end

wide end

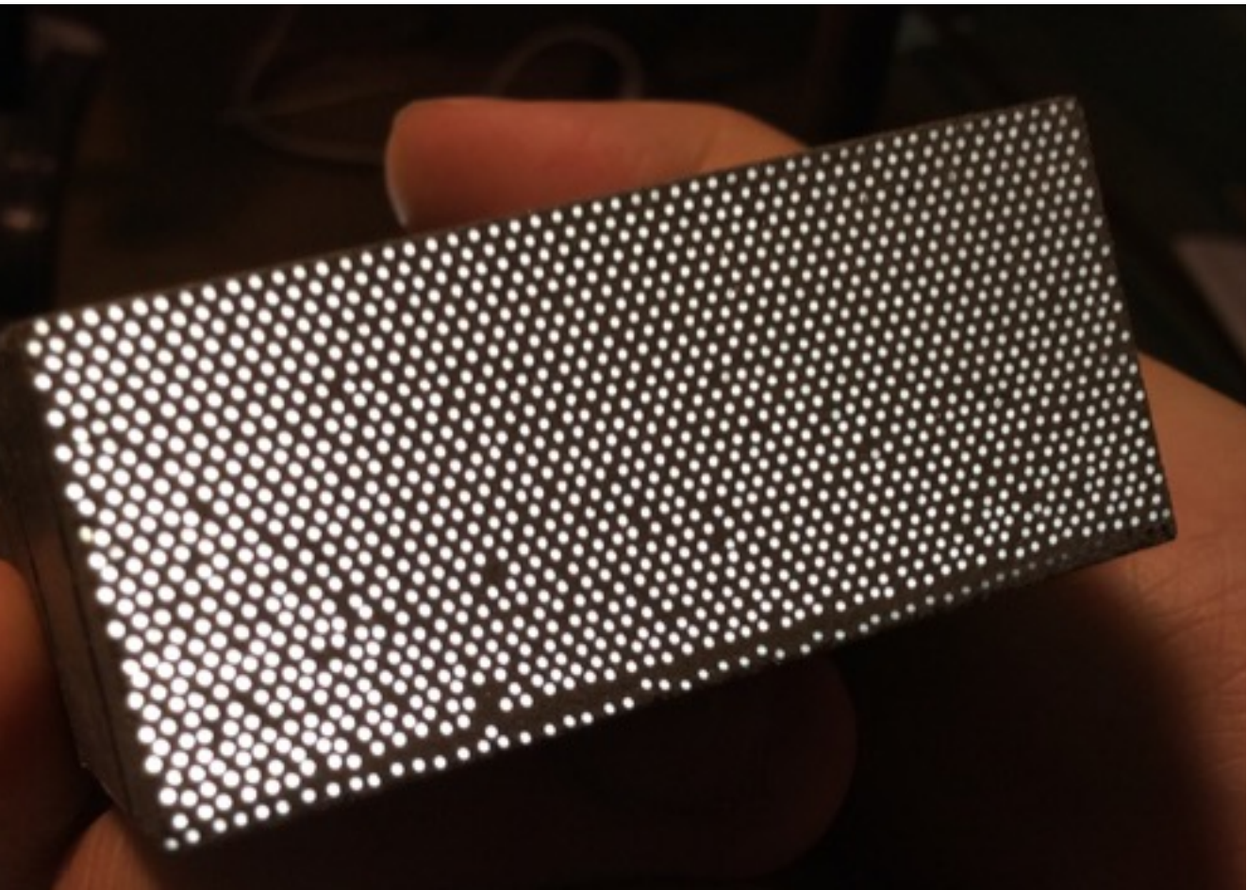


Module 11

Shipped to BNL

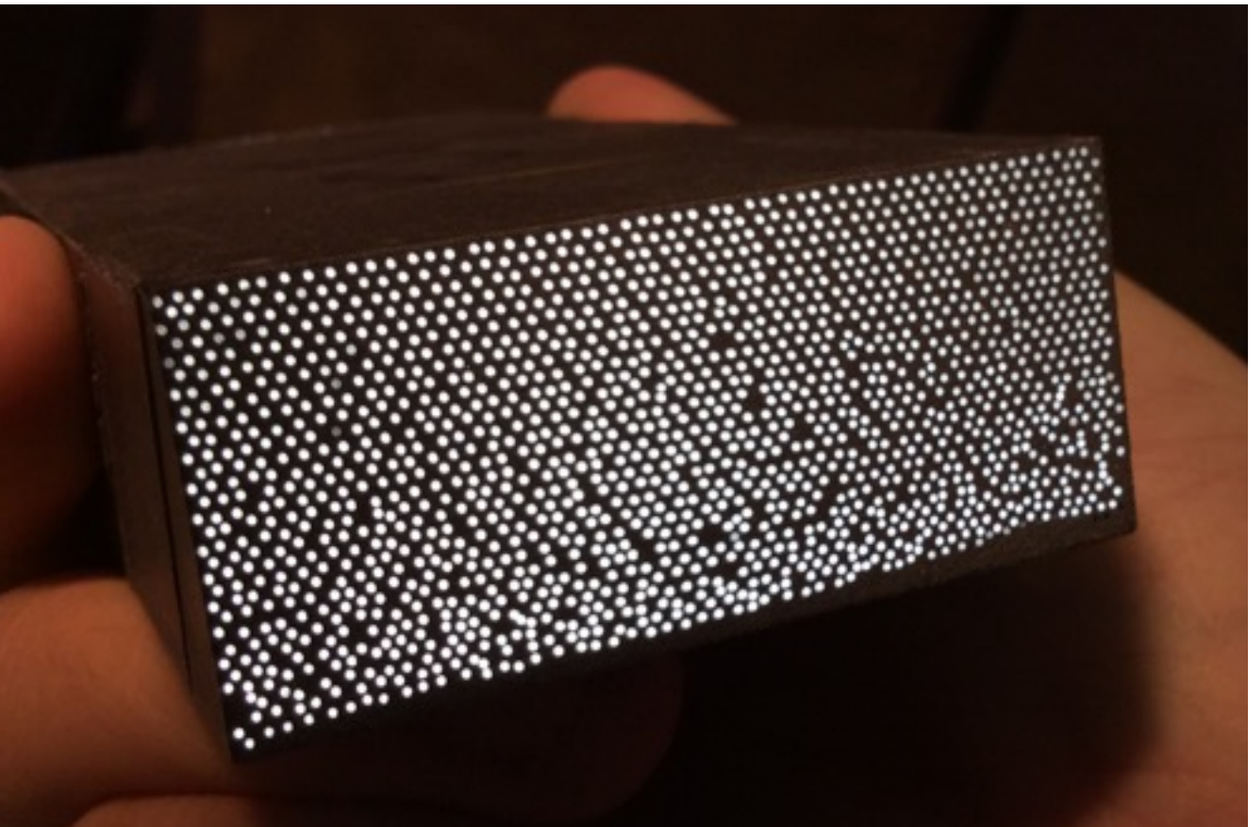
narrow end

wide end



Module 12

narrow end



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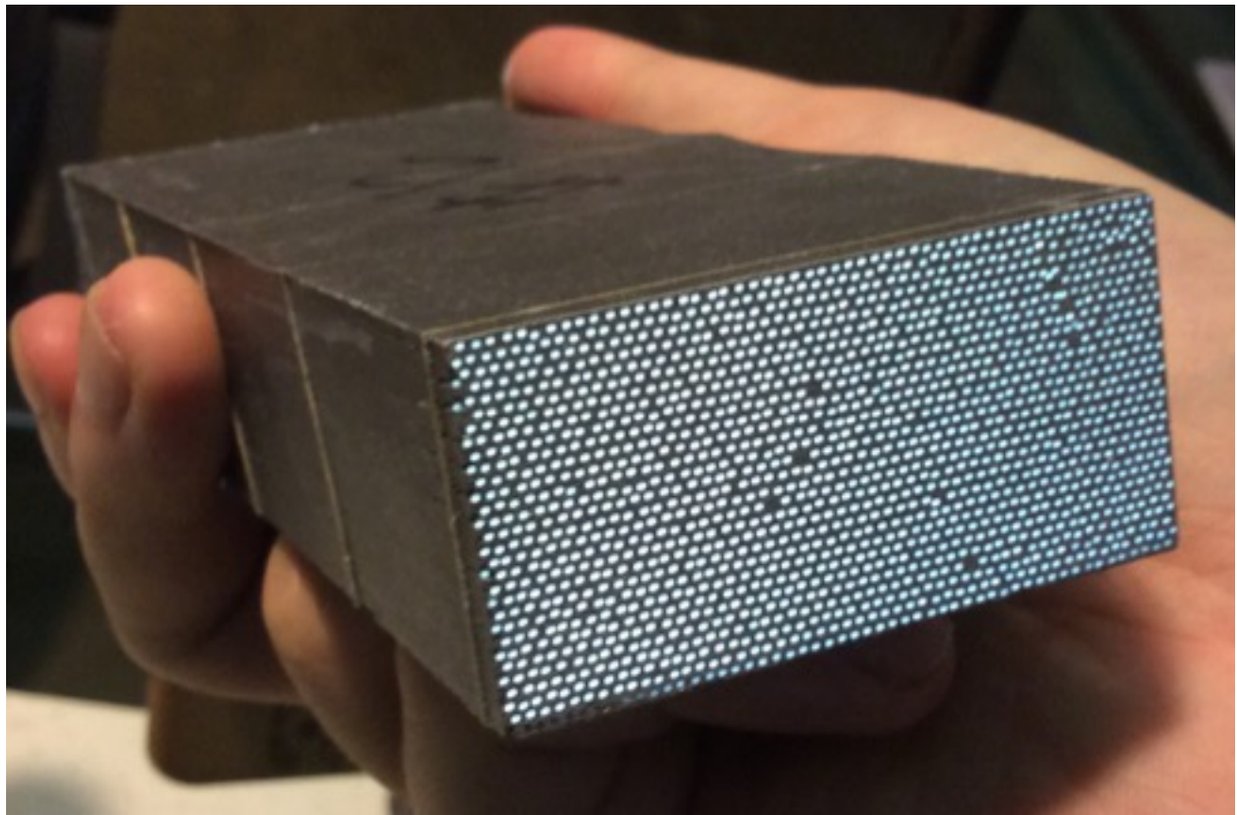
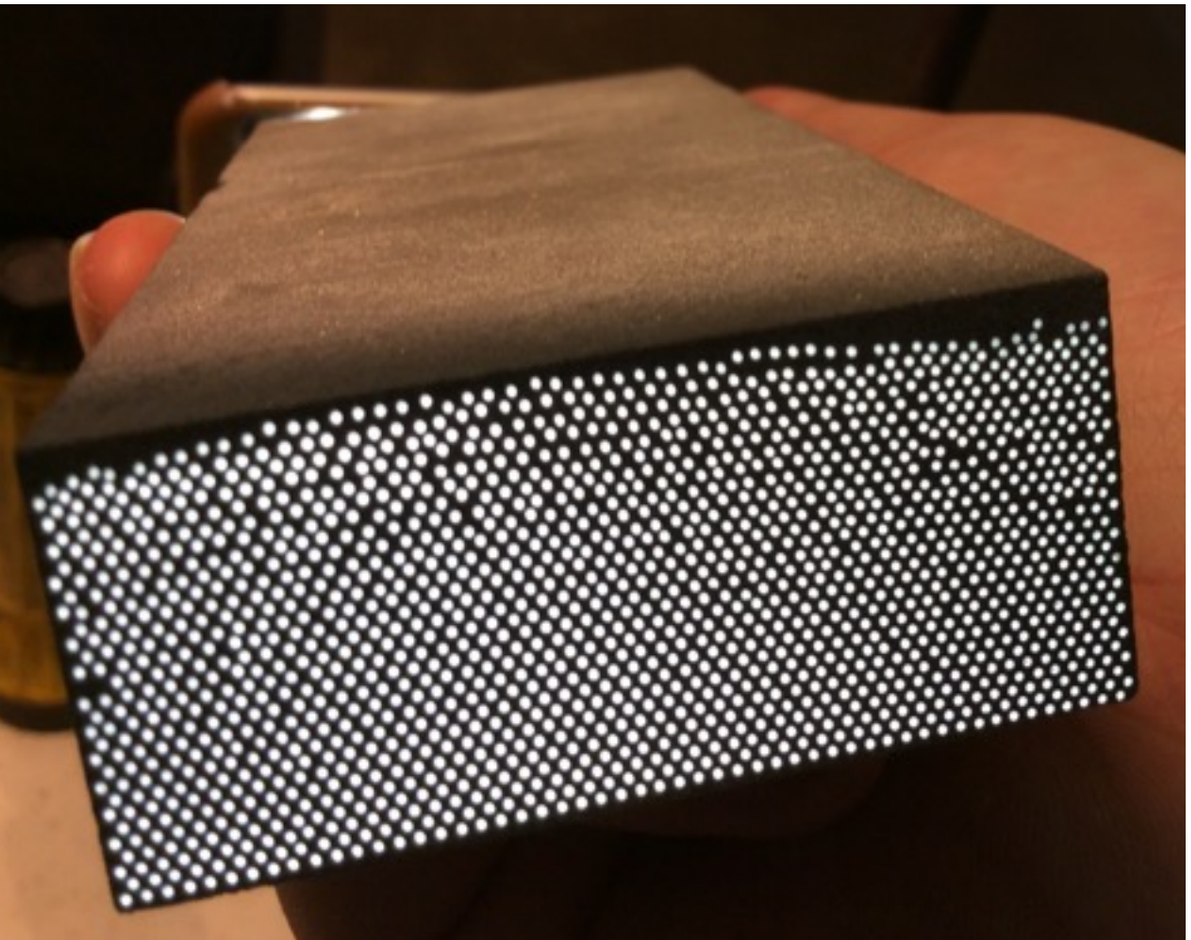


Module 13

narrow end



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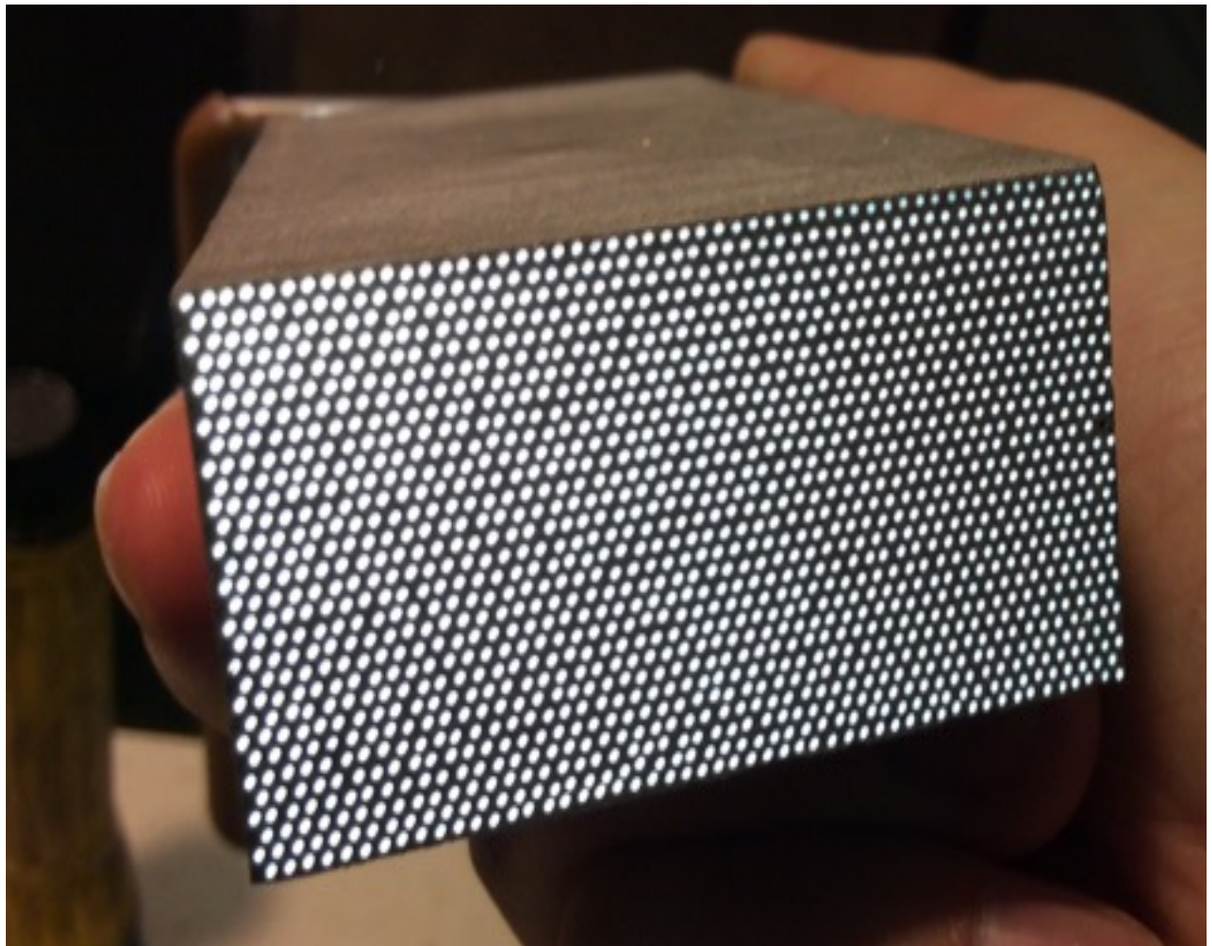
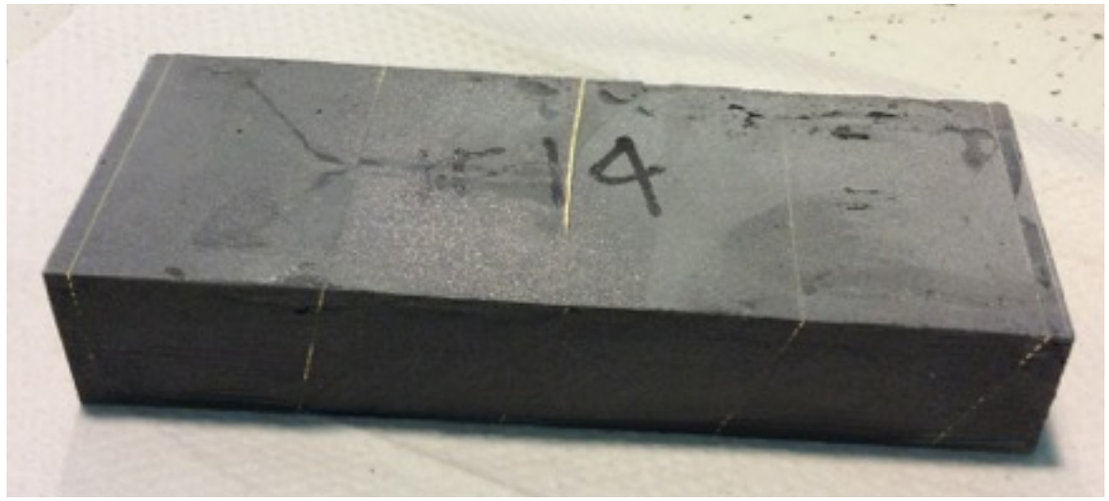
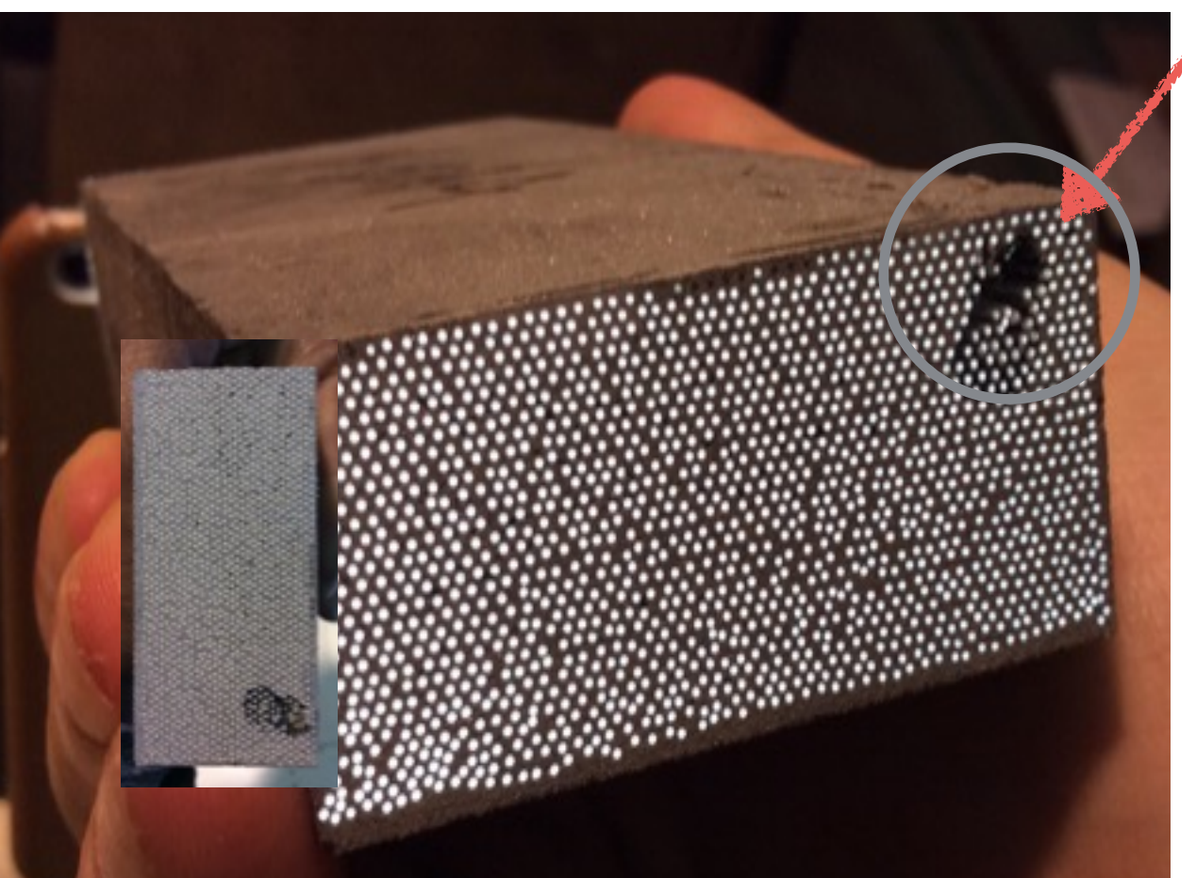


Module 14

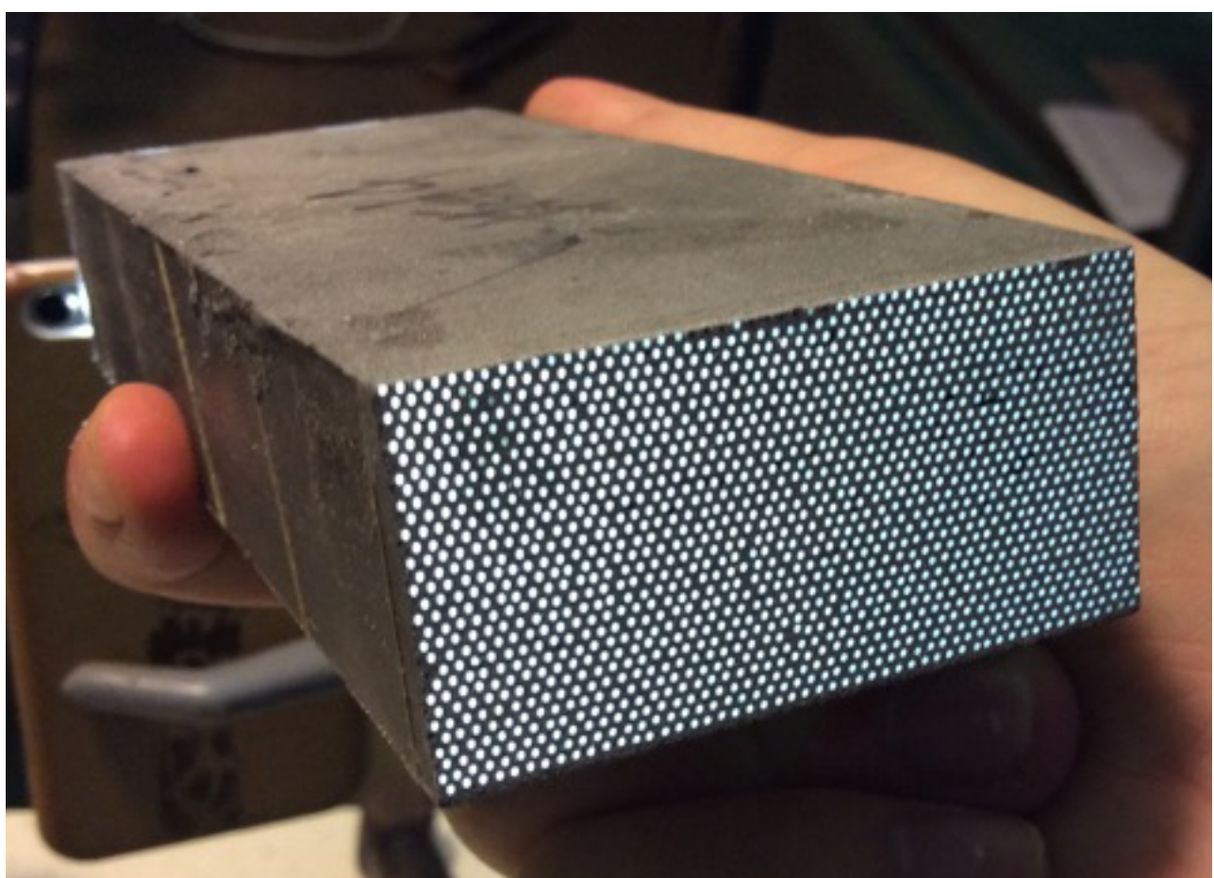


This module has a void. We are not sure why this was caused. However, all other modules do not have this visible void.

narrow end



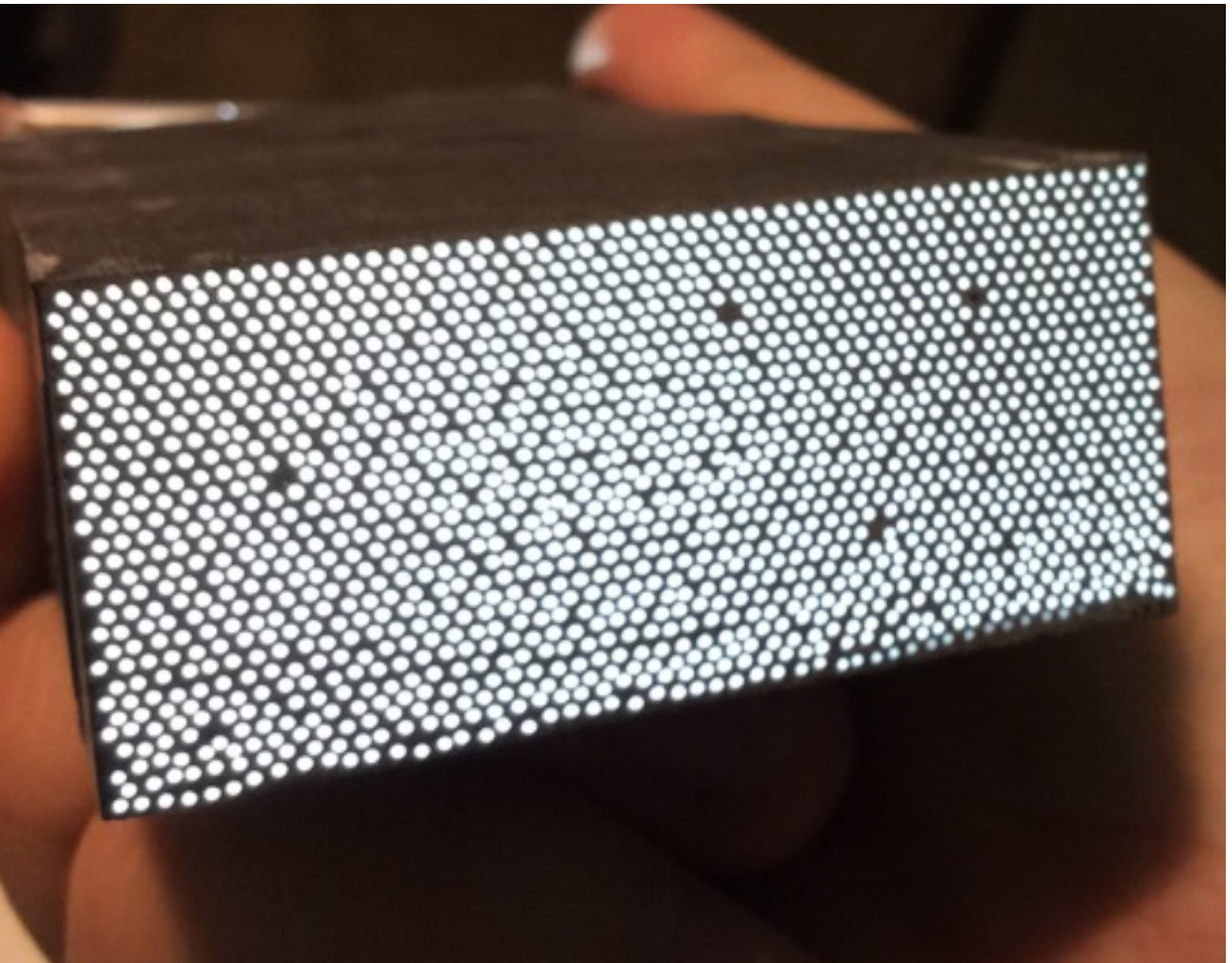
wide end



Module 15

Shipped to BNL

narrow end

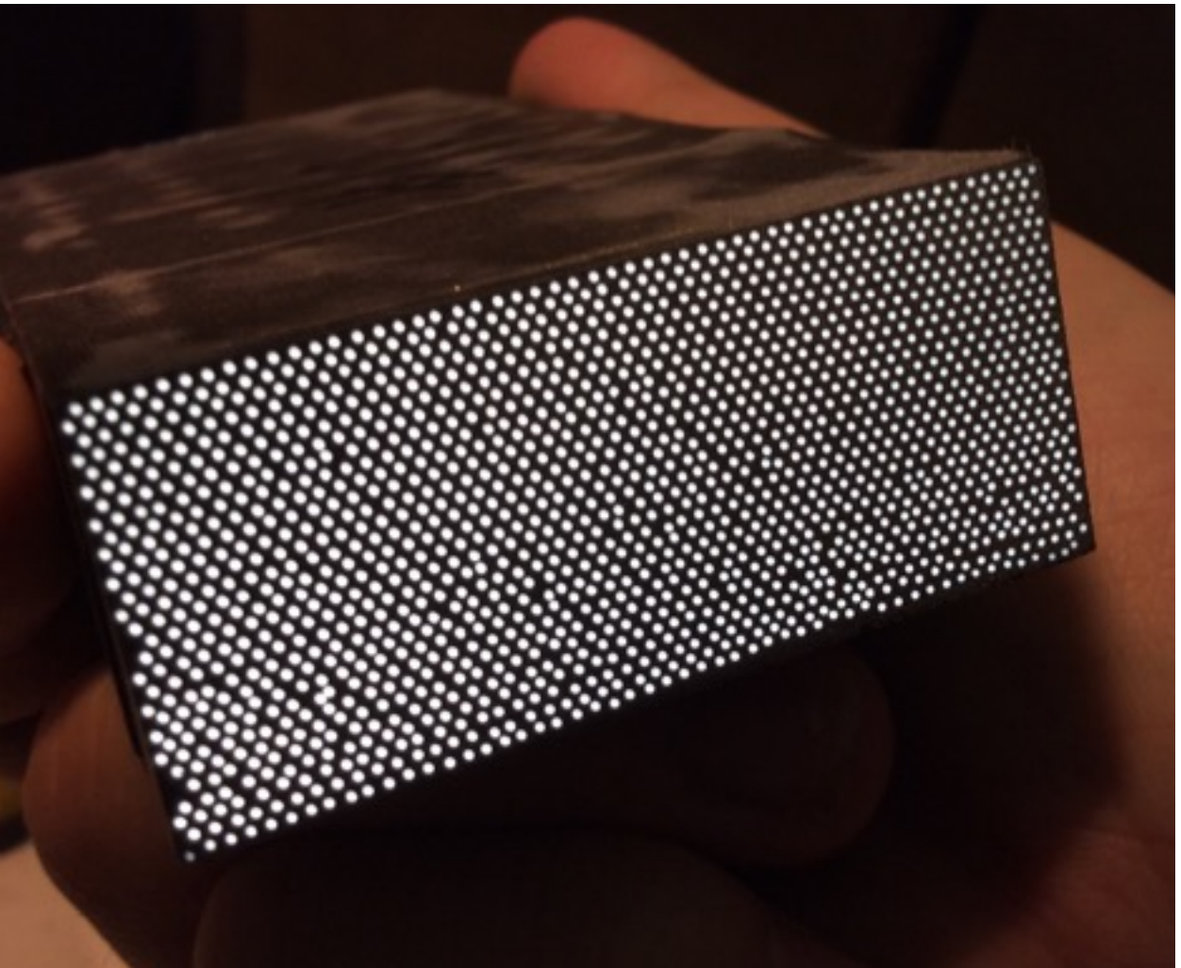


wide end

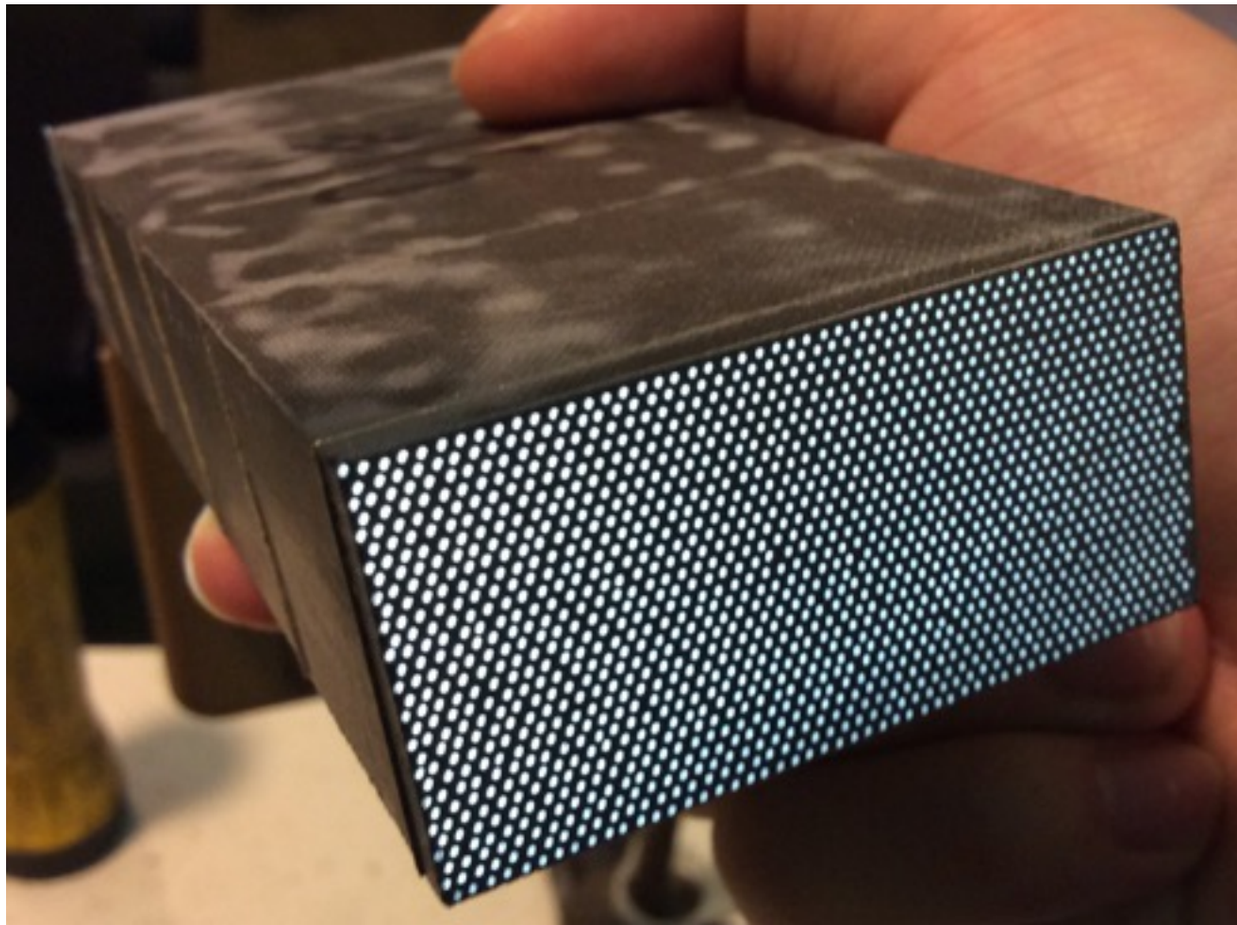
Module 16

Shipped to BNL

narrow end

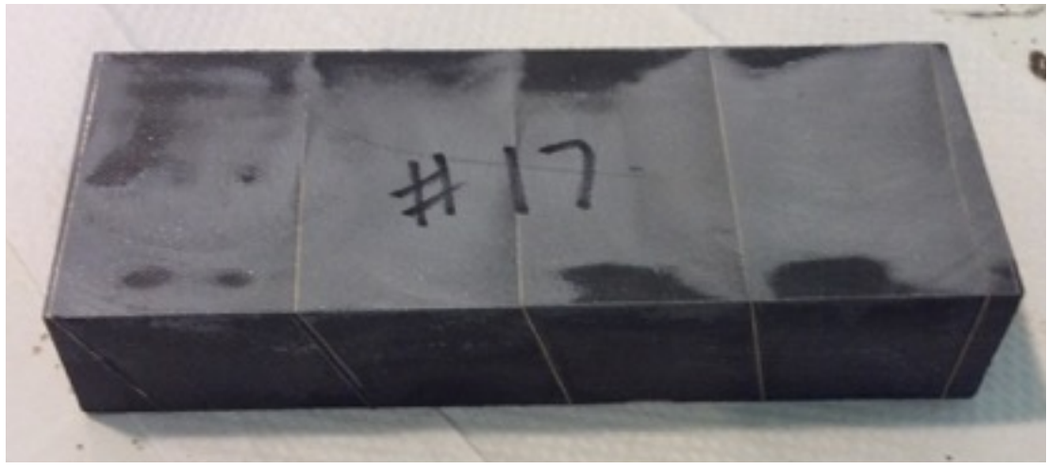


wide end

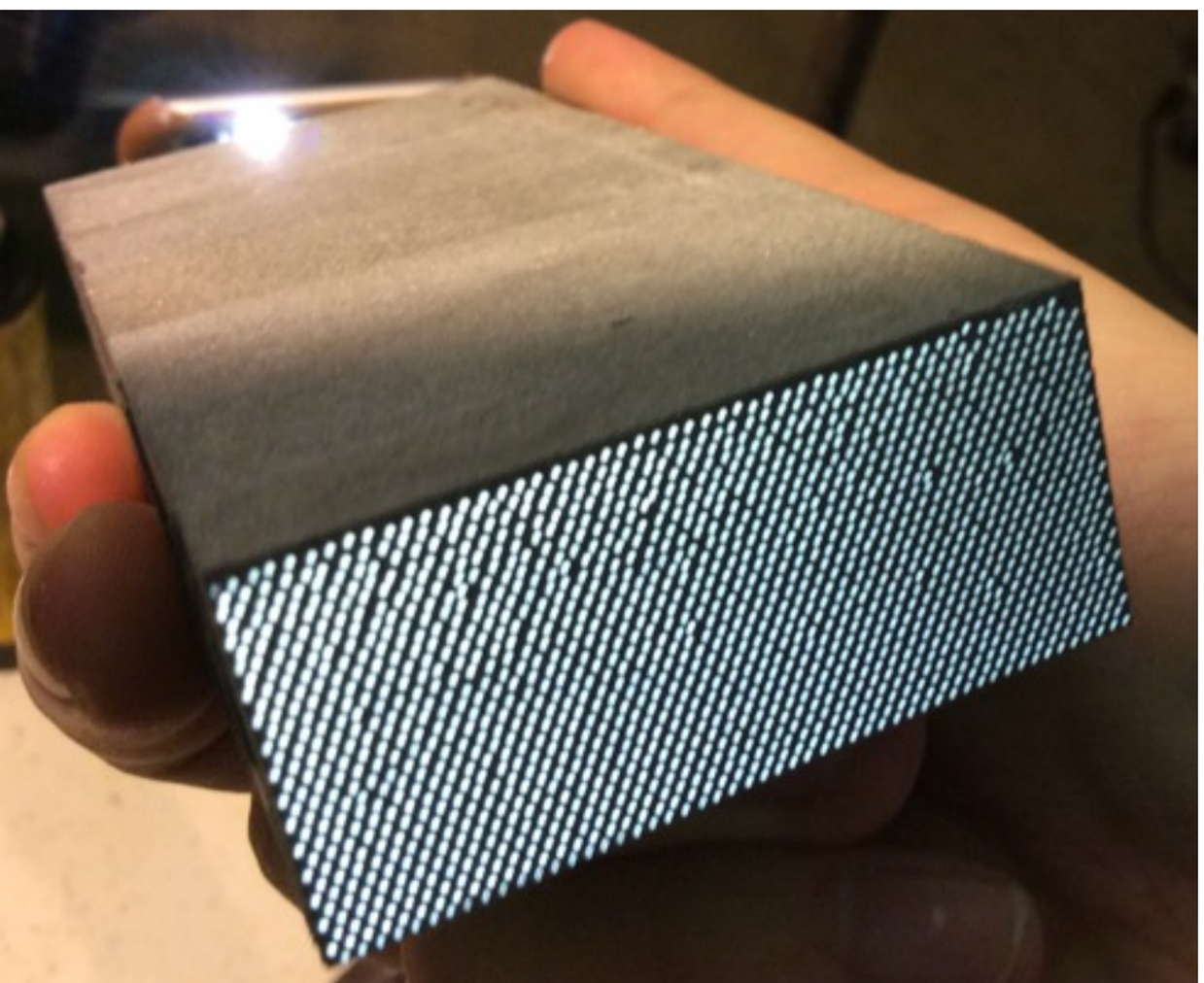


Shipped to BNL

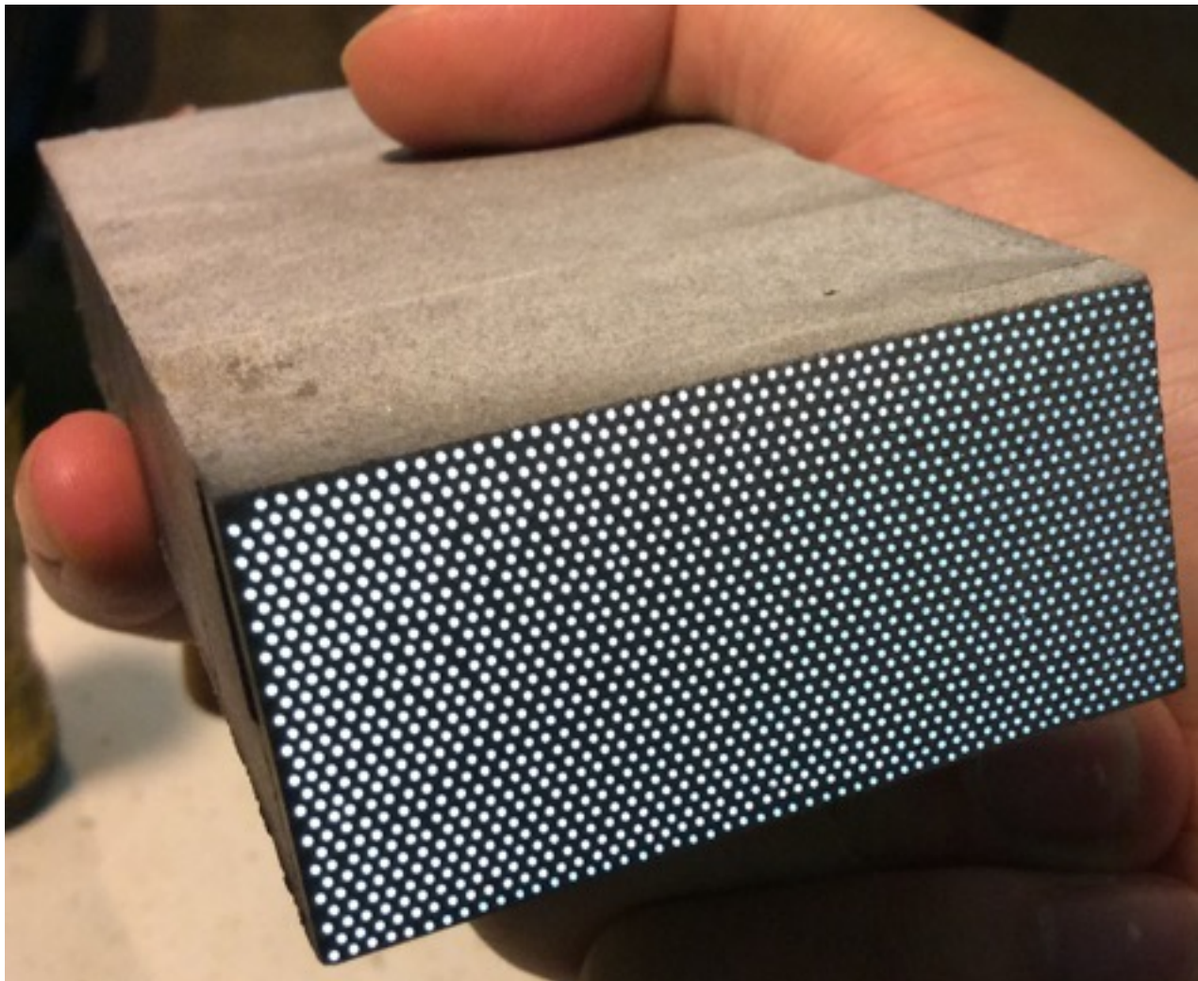
Module 17



narrow end



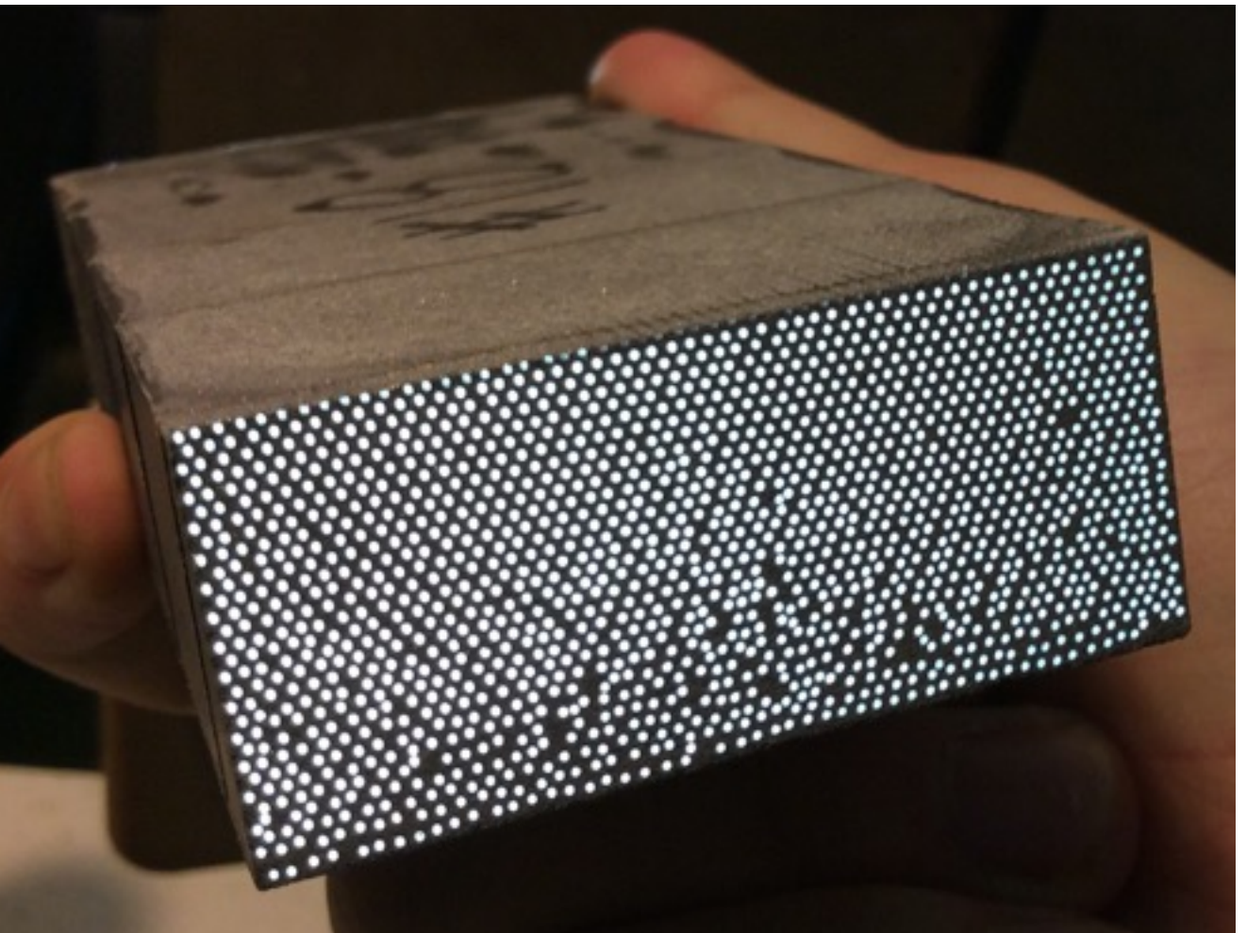
wide end



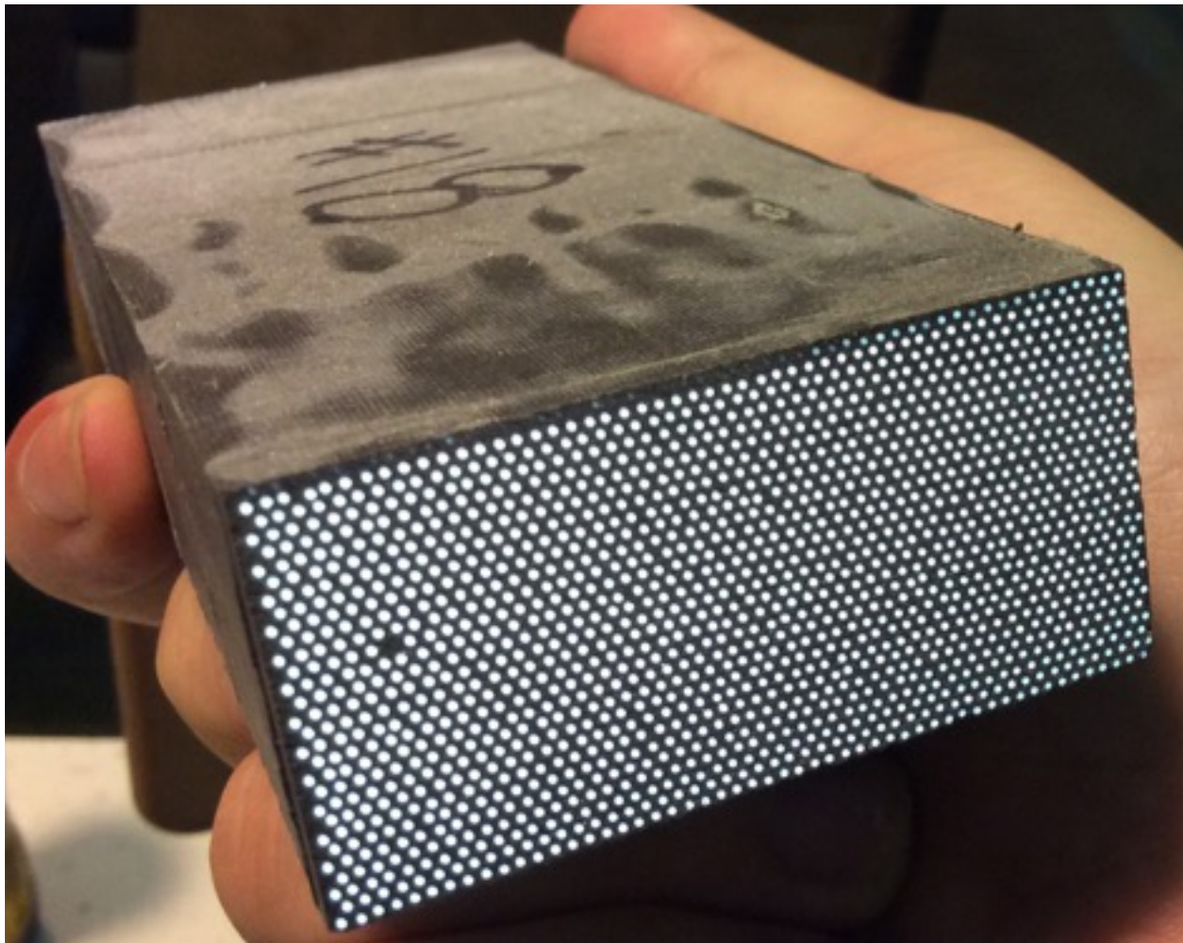
Module 18

Shipped to BNL

narrow end

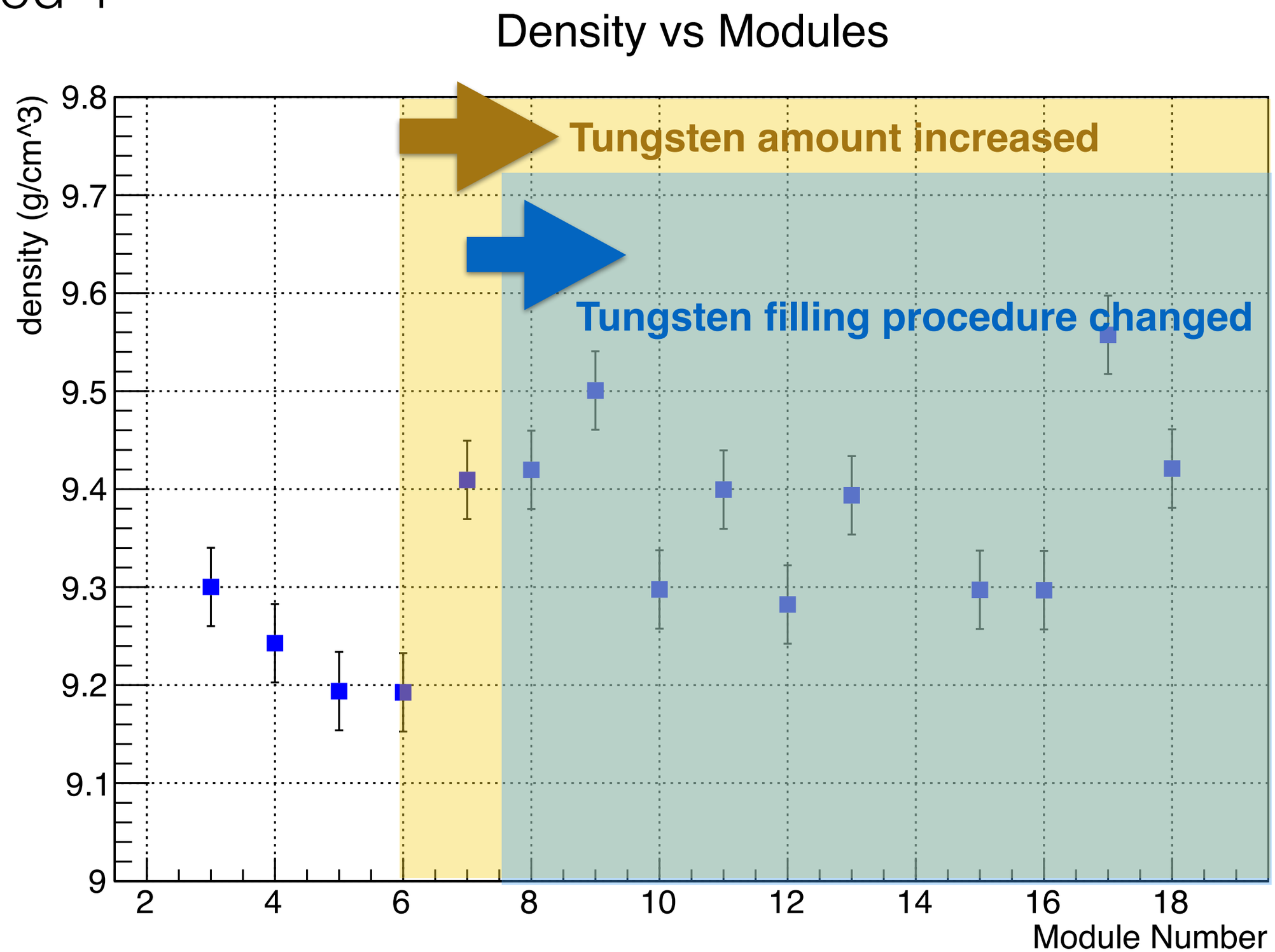


wide end



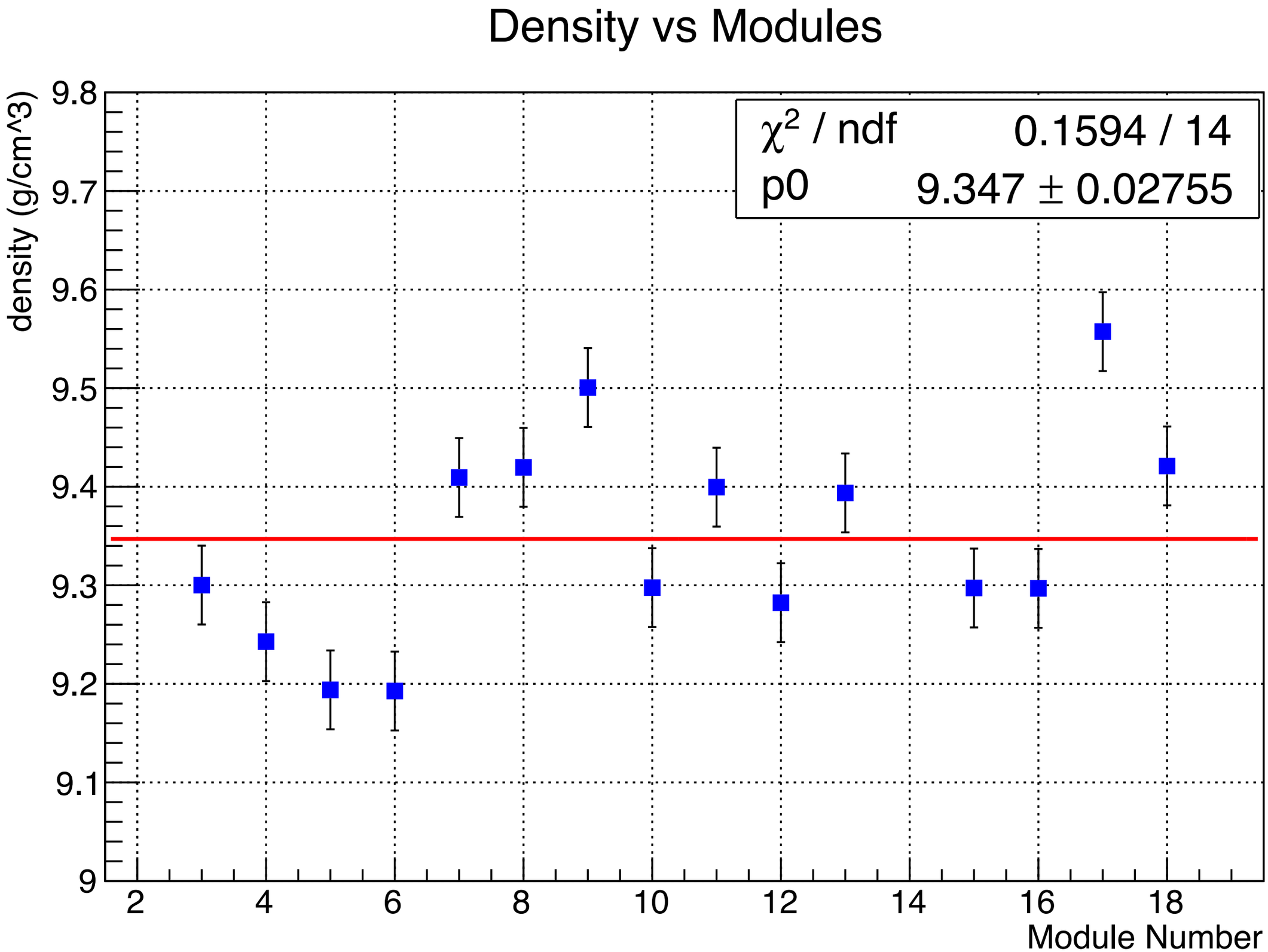
Backup slides

Method 1

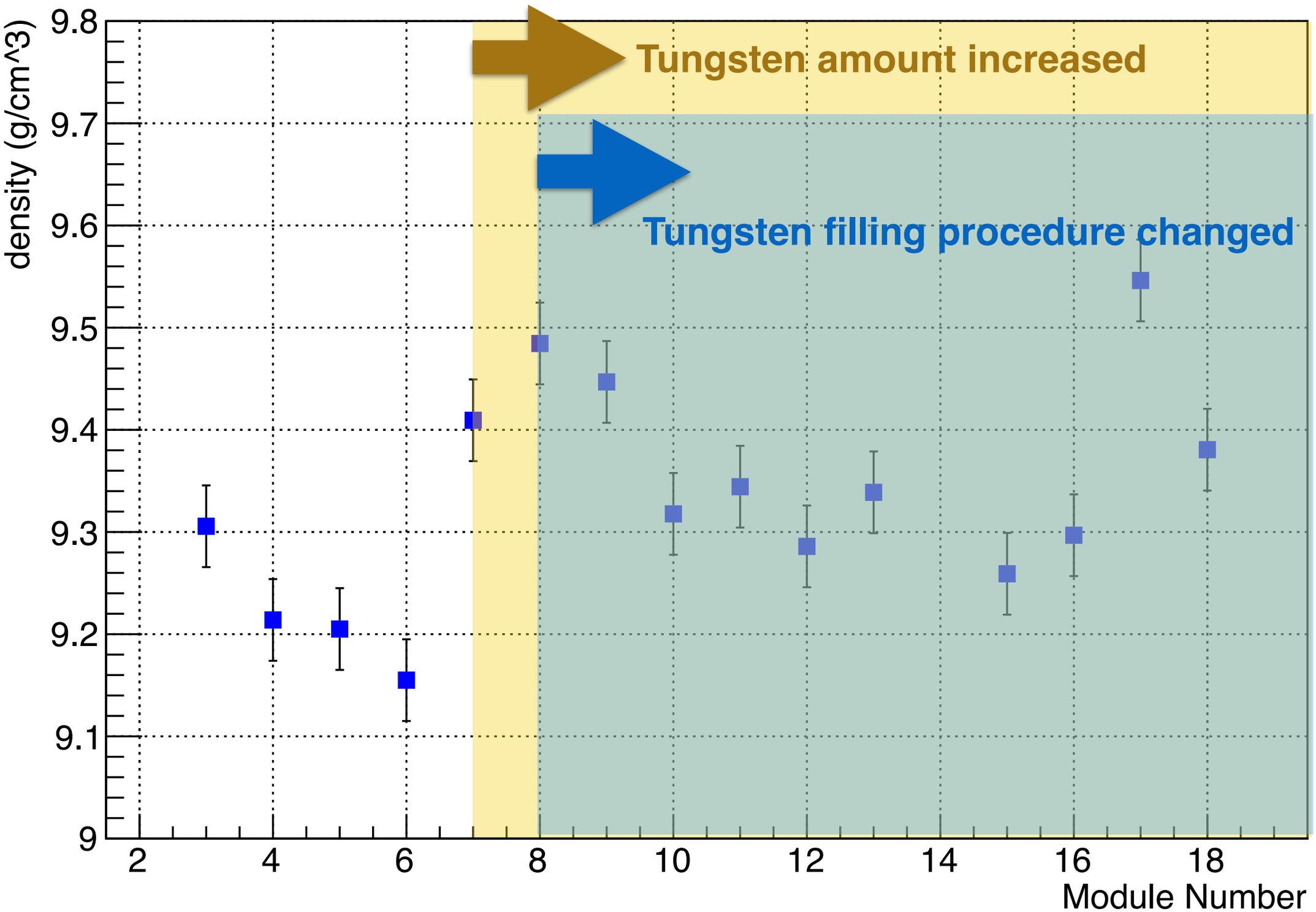


Volume calculated by adding wedge & non-wedge volumes together

Method 1

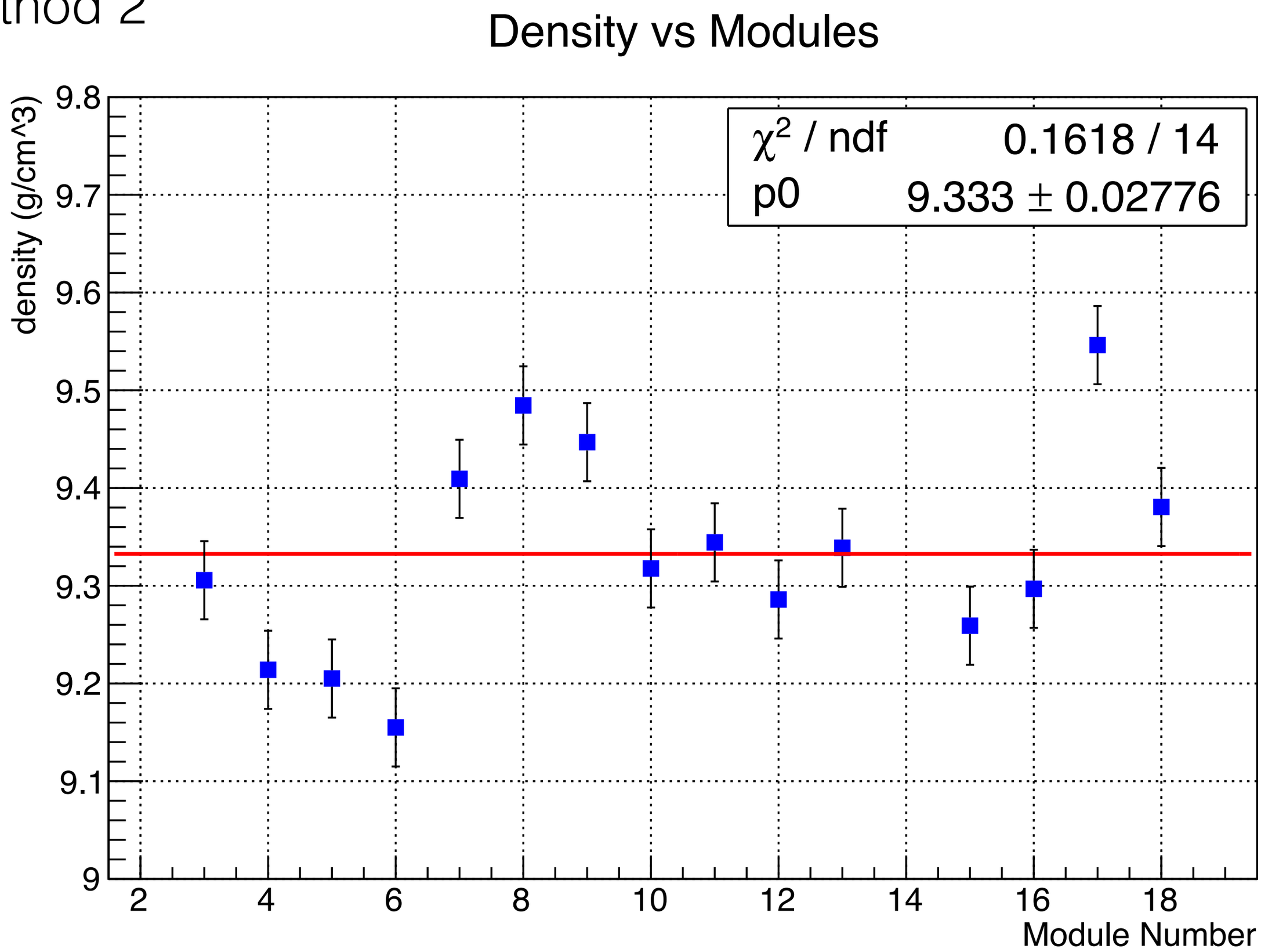

Density vs Modules
χ^2 / ndf 0.1594 / 14
p0 9.347 ± 0.02755
density (g/cm^3)
9.8
9.7
9.6
9.5
9.4
9.3
9.2
9.1
9
2
4
6
8
10
12
14
16
18
Module Number

Method 2



Volume calculated by cross sectional area*length

Method 2


Density vs Modules
χ^2 / ndf 0.1618 / 14
p0 9.333 ± 0.02776
density (g/cm^3)
9.8
9.7
9.6
9.5
9.4
9.3
9.2
9.1
9
2
4
6
8
10
12
14
16
18
Module Number