

## Michigan Target Research and Fabrication

### MiTargets

Sallee Klein

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**Dr. Carolyn Kuranz (PI)**

Professor in Nuclear  
Engineering and  
Radiological Sciences  
Dept. (NERS)

**MiTRF** (LaserNetUS Node)

Michigan Target Research and Fabrication

**MiTargets** (targets and services for sale!)

**CHEDAR** (NNSA Center of Excellence)

Center for High-energy-density [Laboratory]

Astrophysical Research

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- DOE Office of Science, Fusion Energy Sciences, under contract number DE-SC0024546: the LaserNetUS Initiative
- U.S. Department of Energy NNSA Center of Excellence under cooperative agreement number DE-NA0004146.



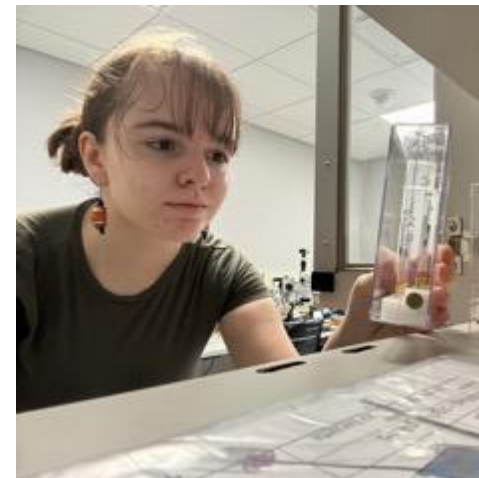
Sallee Klein  
Sr. Engineer

- B.S. Physics (UCSD)
- 15 years leading Michigan Target Fab



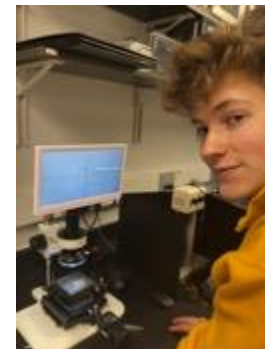
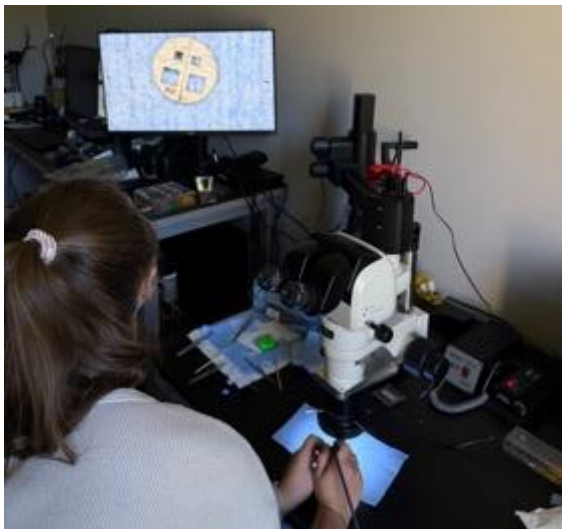
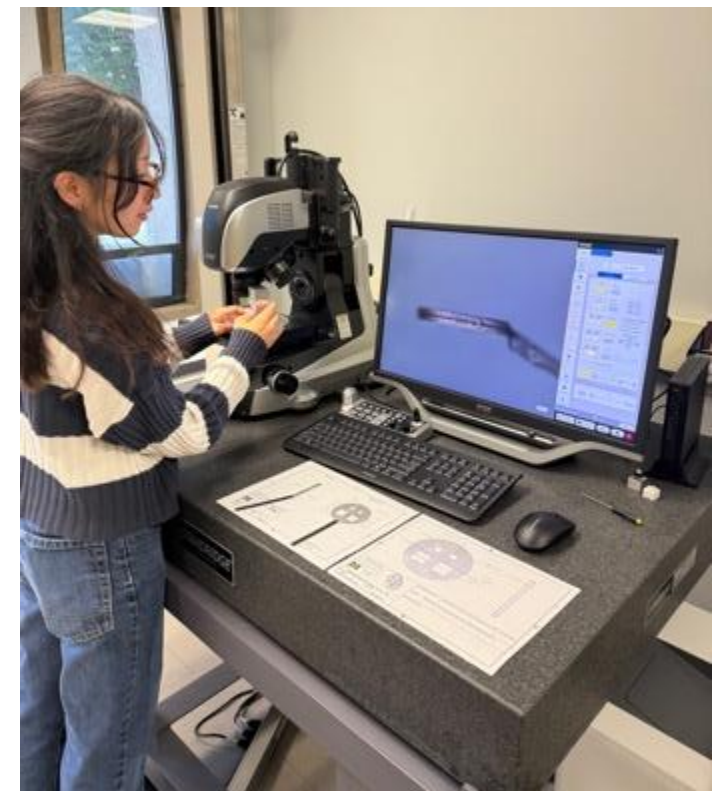
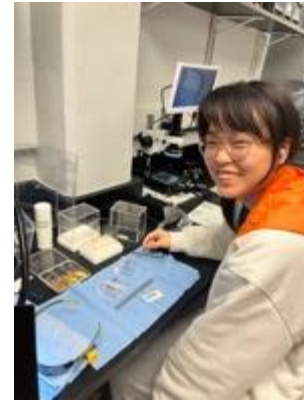
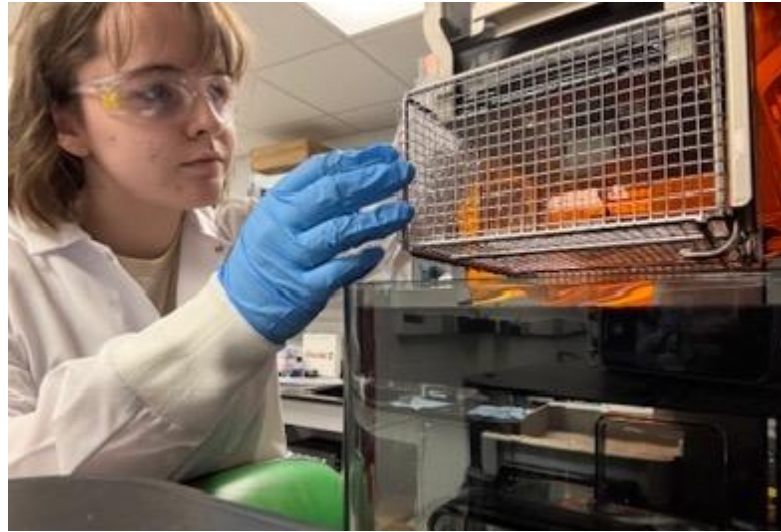
Jill Schell  
Engineer

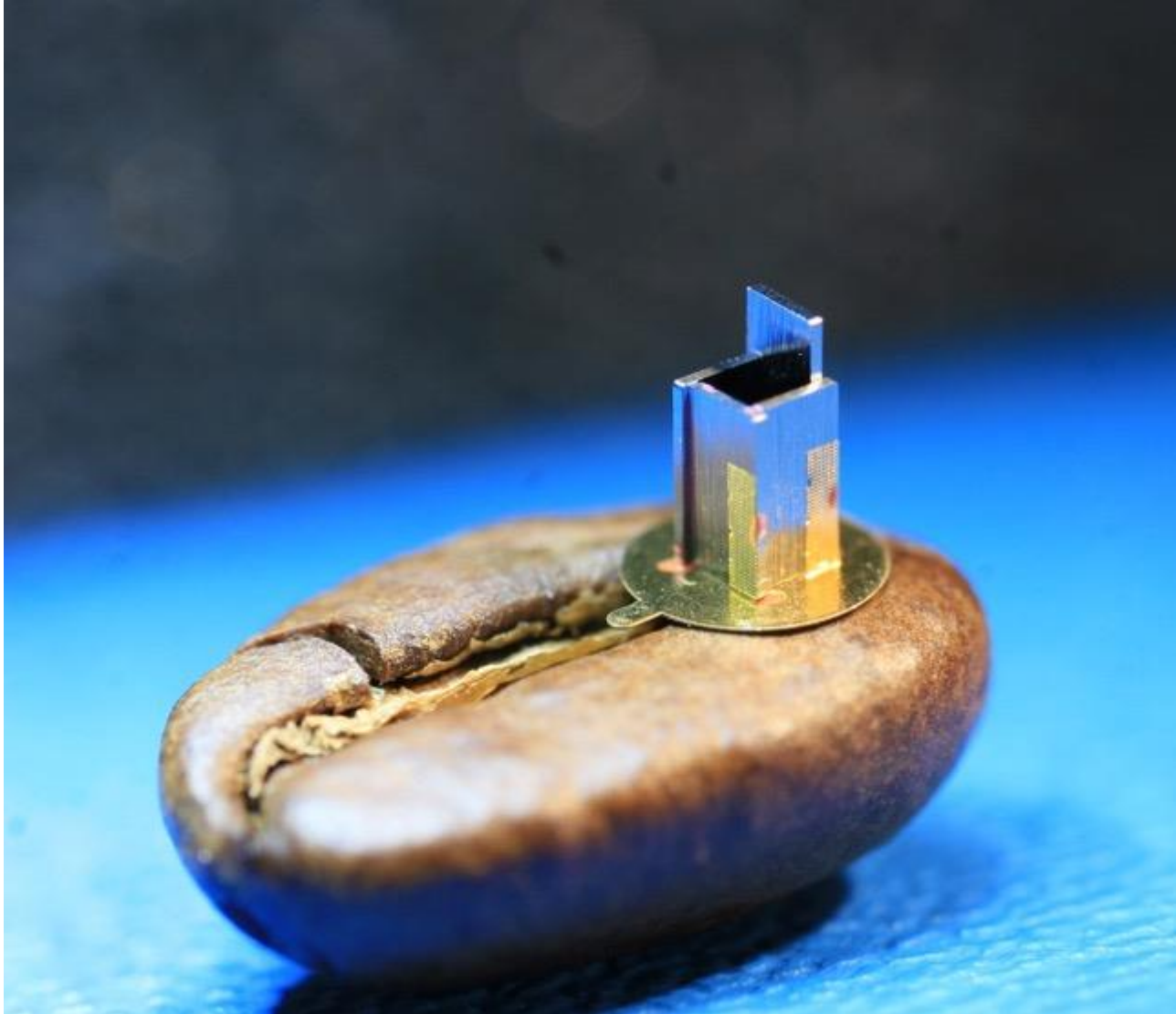
- B.S. Physics (UMich)
- 2.5 years Michigan Target Fab
- single-handedly grew our undergrad participation into a team
- social media visibility



Selma Zuhrić  
Engineer

- B.S.E. Biomedical Engineering (UMich)
- 2 years Michigan Target Fab
- Fully supported several campaigns
- leading the expansion of MiTRF's manufacturing capabilities



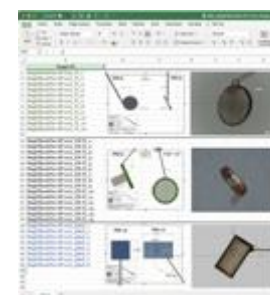
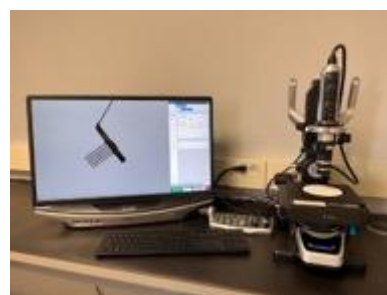
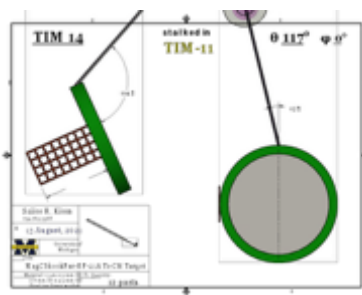
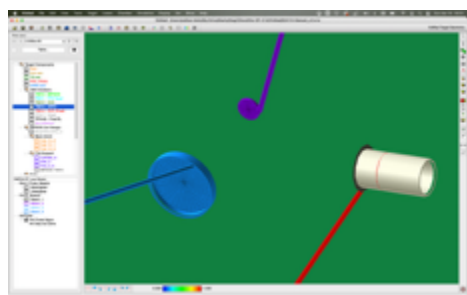


- In 2001, NIF Early Light campaigns were beginning, Paul Drake was concerned that NIF would consume significant target fabrication resources and started funding target fabrication efforts at Michigan.
- While initially this effort only supported experiments led by Paul Drake or Carolyn Kuranz, in 2017 we began supporting external campaigns ad hoc for national labs, academic institutions, private companies, and LaserNetUS.
- Now we can provide targets to everyone!

## In-house

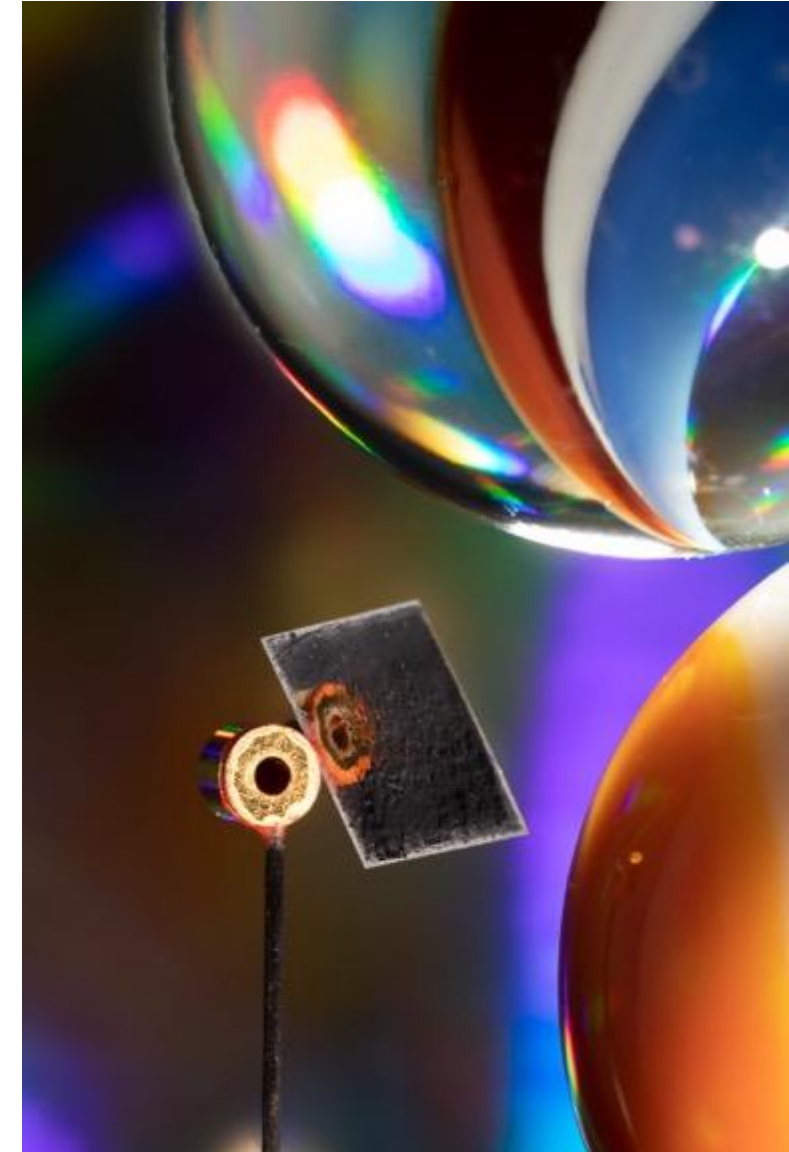
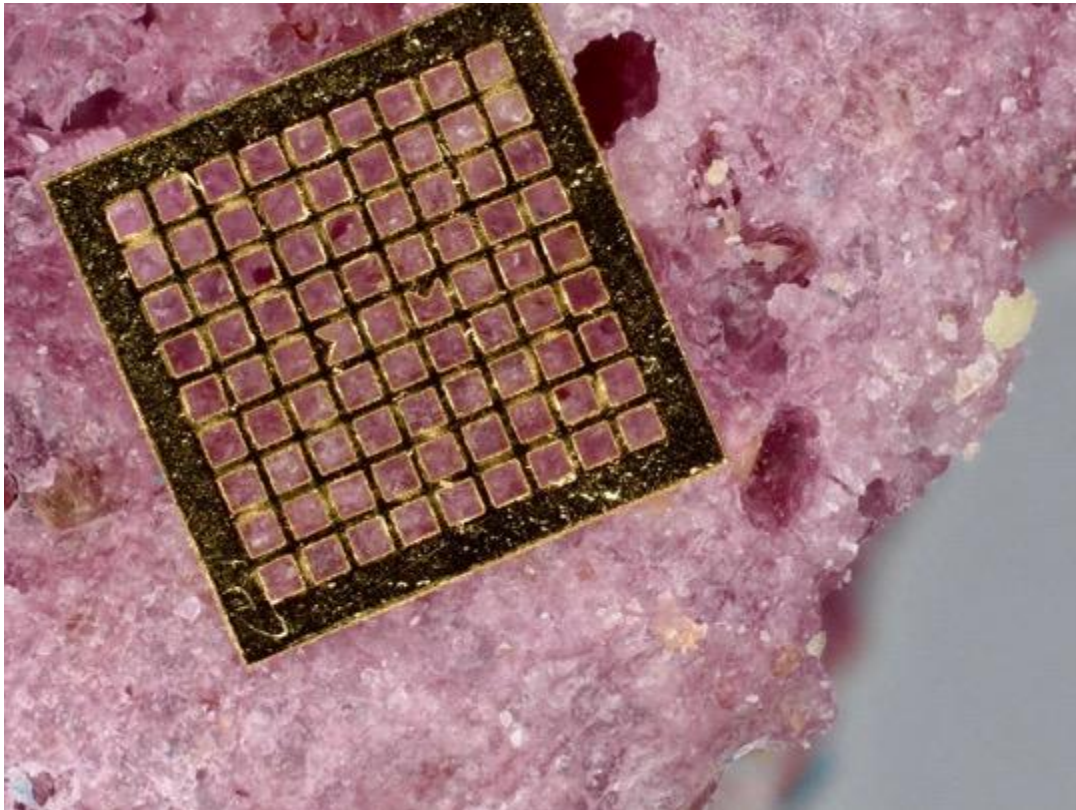
- CAD models, drawings and designs
  - targets
  - experimental fixtures
  - transport cases
- laser-cutting (up to 0.5 mm)
  - thin metals
  - many plastics
- micro-assembly
- characterization/metrology
- delivery with on-site assembly/support if appropriate
- target repository

Laser	Institution	Qty. of targets per campaign
Omega-60 Omega-EP MTW	LLE	6 - 90
Jupiter Laser Facility	LLNL	30 - 125
Advanced Laser Light Source	INRS	betatron x-ray filter
MEC/LCLS	SLAC	target arrays
Z Machine	SNL	gas cells
CoReLS	GIST	100 - 200



## On-site laser-cutter

- Keyence MD-U1000 UV laser-marker
- custom fiducials
- component labeling



## Dana Design

micro-machining

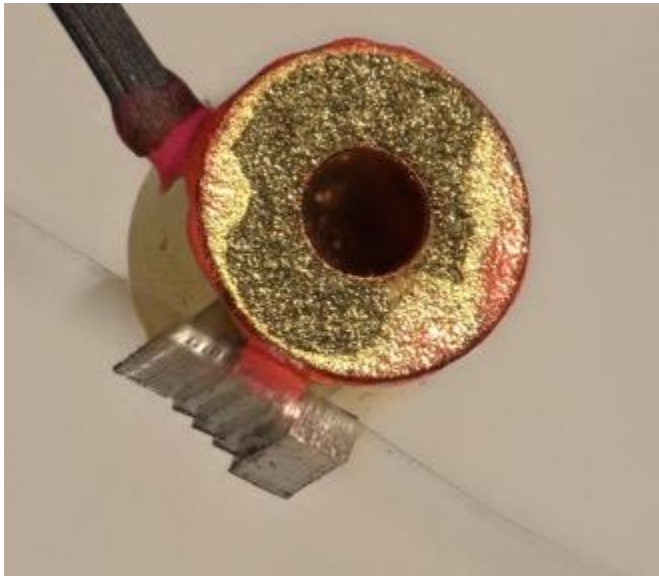
- target bodies
- experimental set-up
- components
- Sonoma, CA

## plastics

- acrylic
- Vespel SP-1 (PI)
- PC
- Delrin
- PEEK

## metals

- Al (1100)
- Au
- W
- Ta
- so much more!

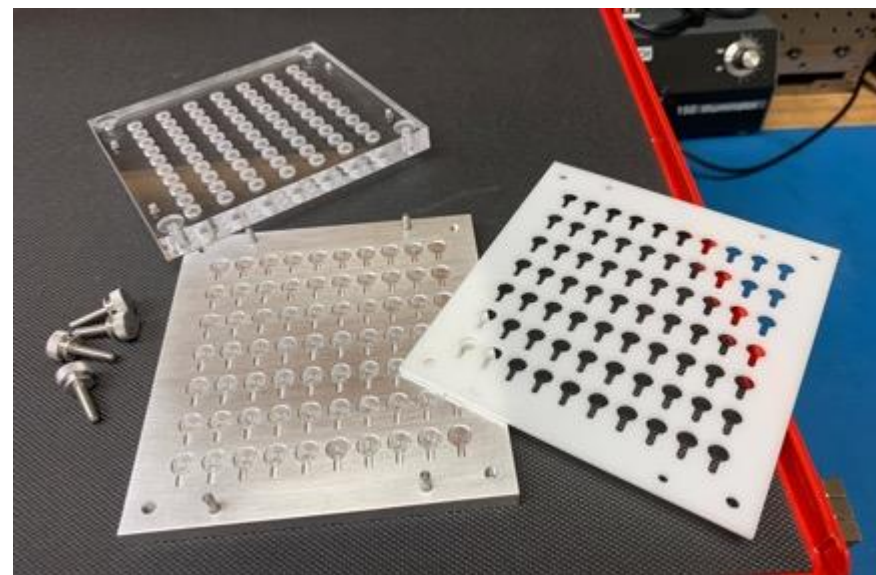
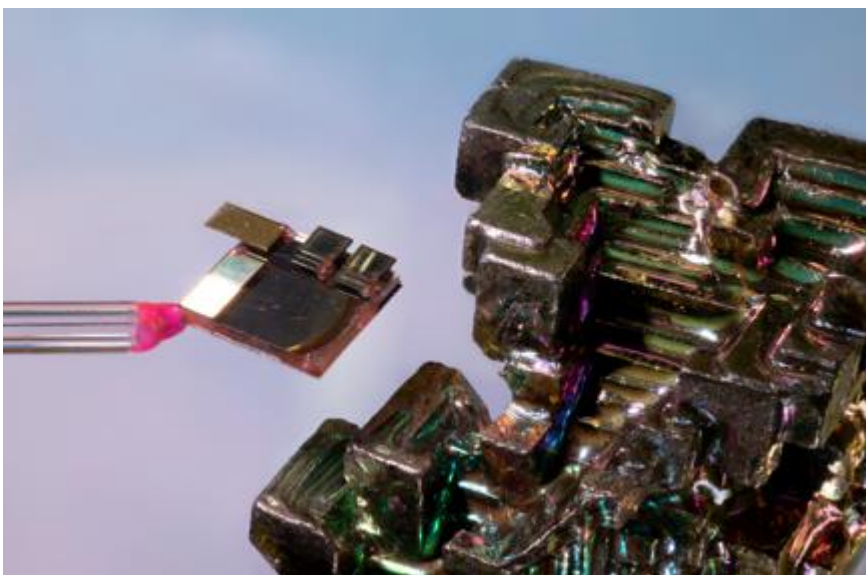
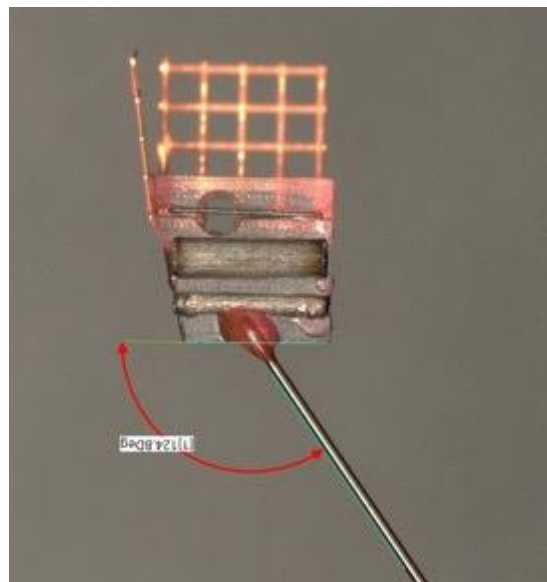


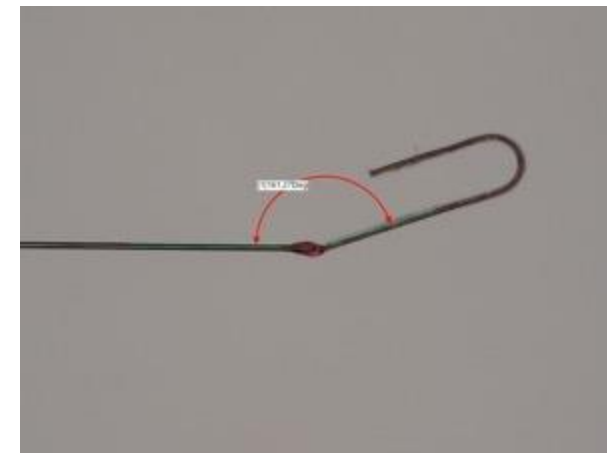
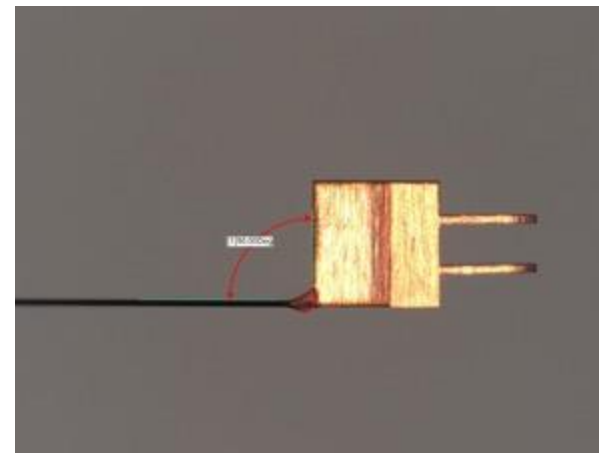
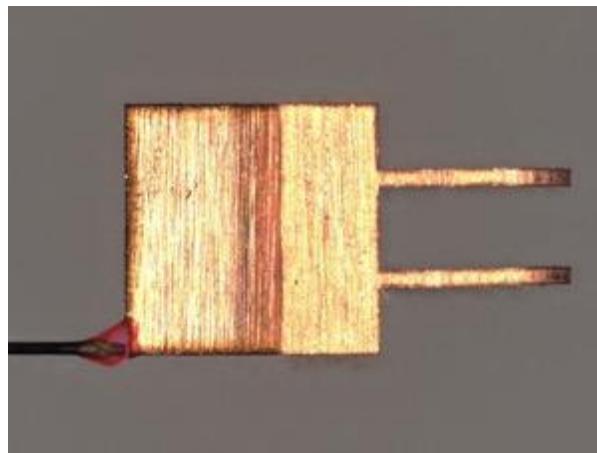
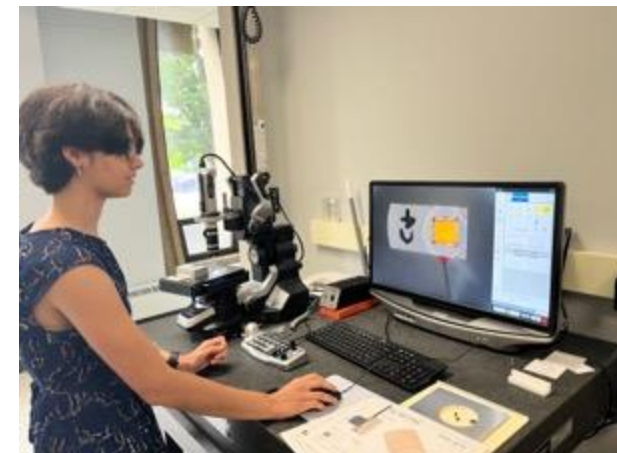
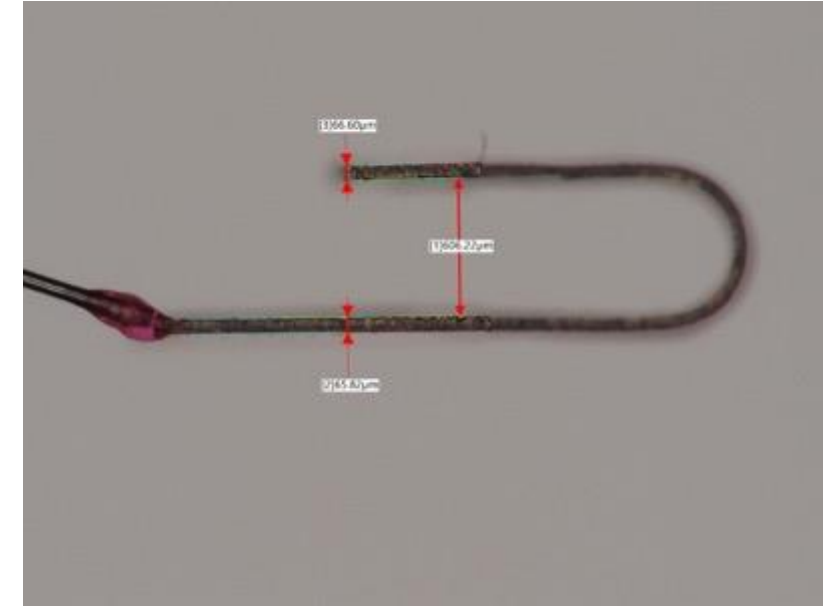
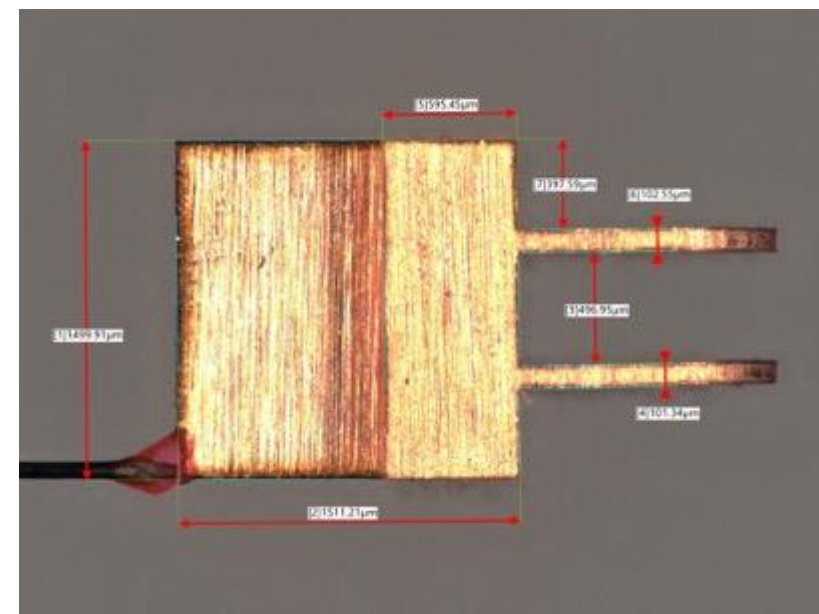
Scitech Precision • Lebow • Gateway Laser • Asphera • Potomac Photonics • Luxel • Gilder

- thin films/thin film stacks
- coatings
- hohlraums
- foams
- 2PP/3D-printing
- custom lithography (6 $\mu$ m features)
- laser-cutting of materials we cannot do in-house
- quartz windows
- capsules
- beryllium (in component form)
- General Atomics (GA)\*



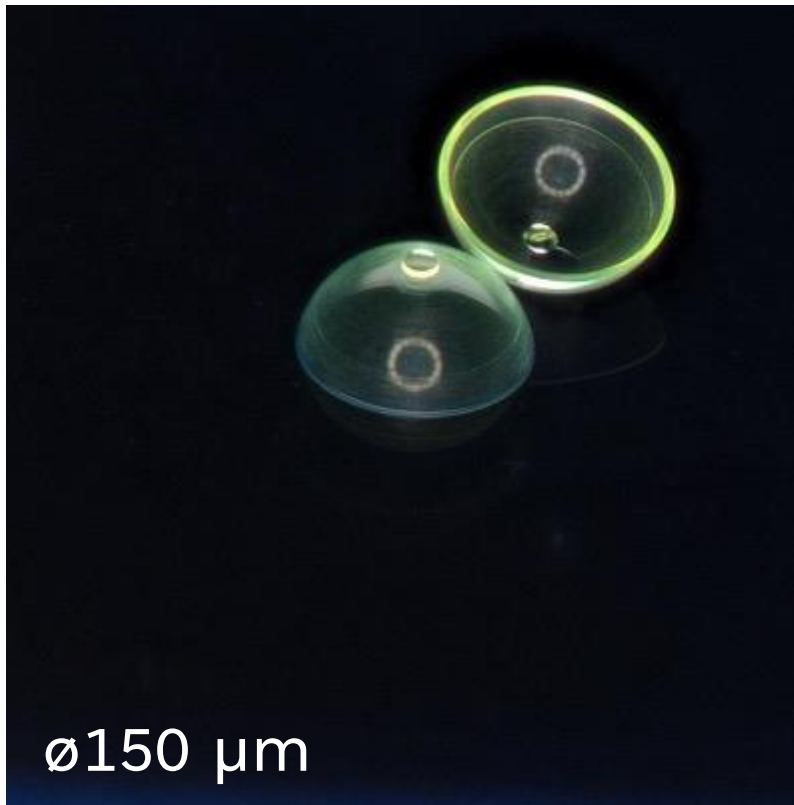
# Assemblies





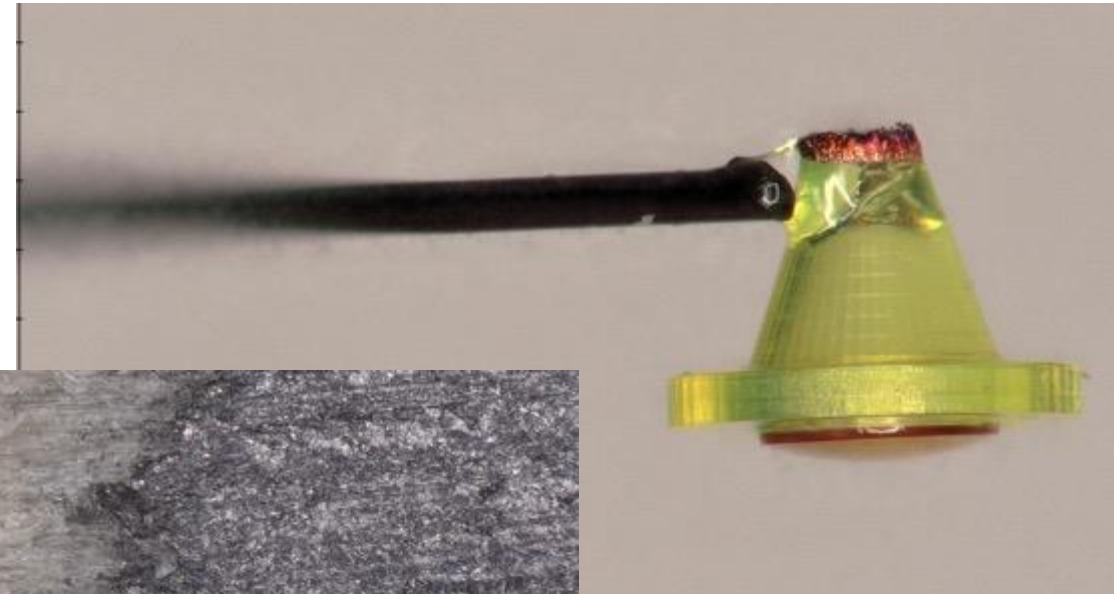
## Keyancé

- VHX-7000
- 20x – 1000x
- backlight
- 90-degree tilt



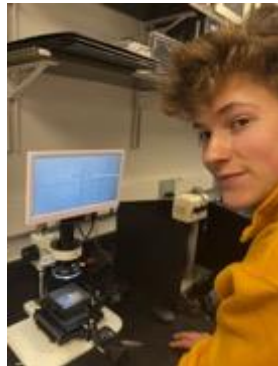
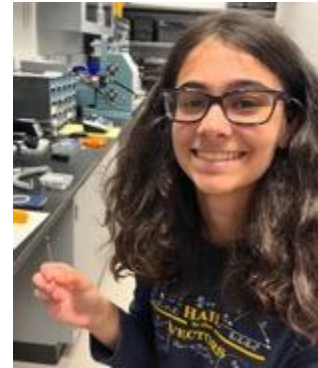
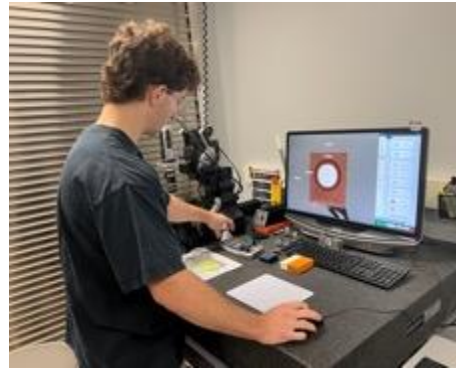
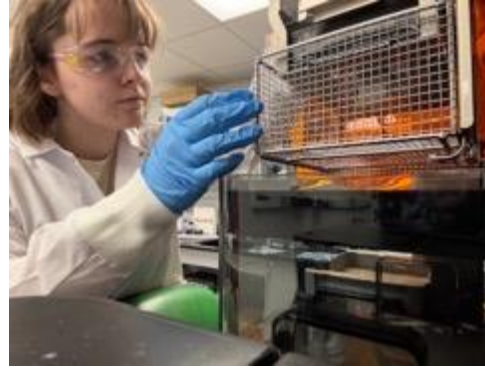
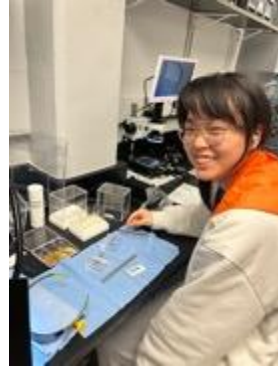
## Keyanú

- VHX-X1
- 5x – 2500x
- backlight
- 45-degree tilt



## target fabrication

- laser-cutting
- laser-marking part IDs
- stalks
- assembly of targets (with oversight :)
- metrology
- target IDs and measurements
- packaging and labeling
- 3D printing of jigs and set-ups
- social media



## LLE

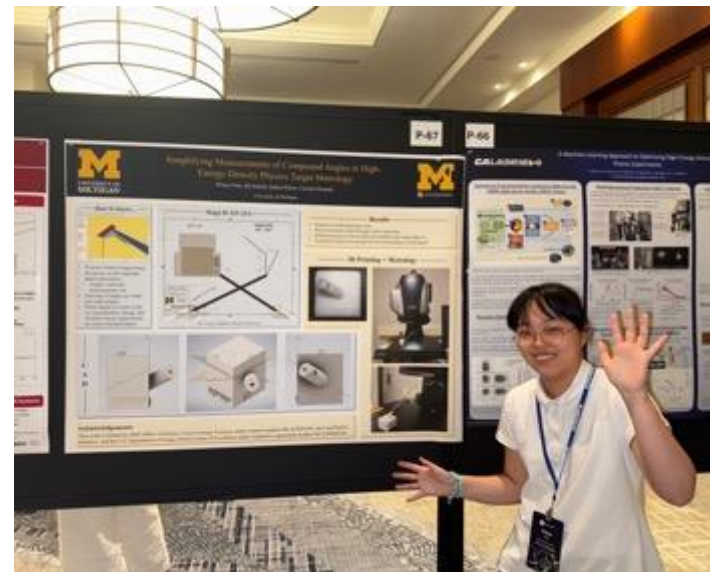
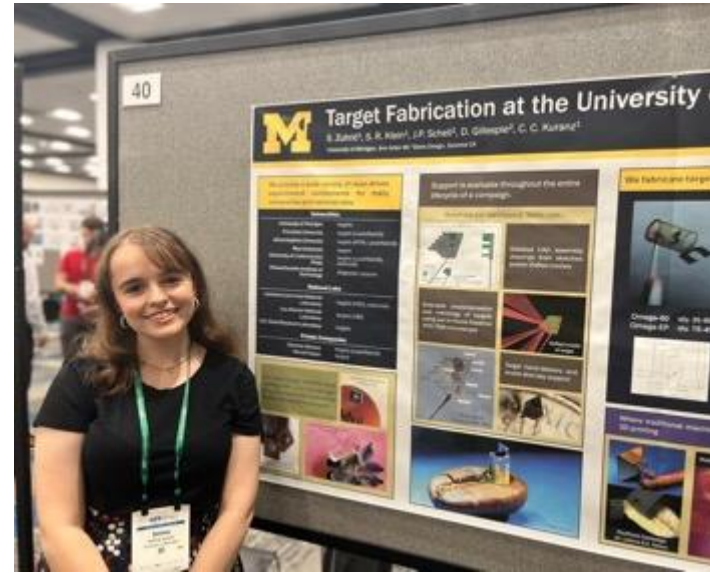
- participate in target delivery and liquid fills
- sit in on shot days

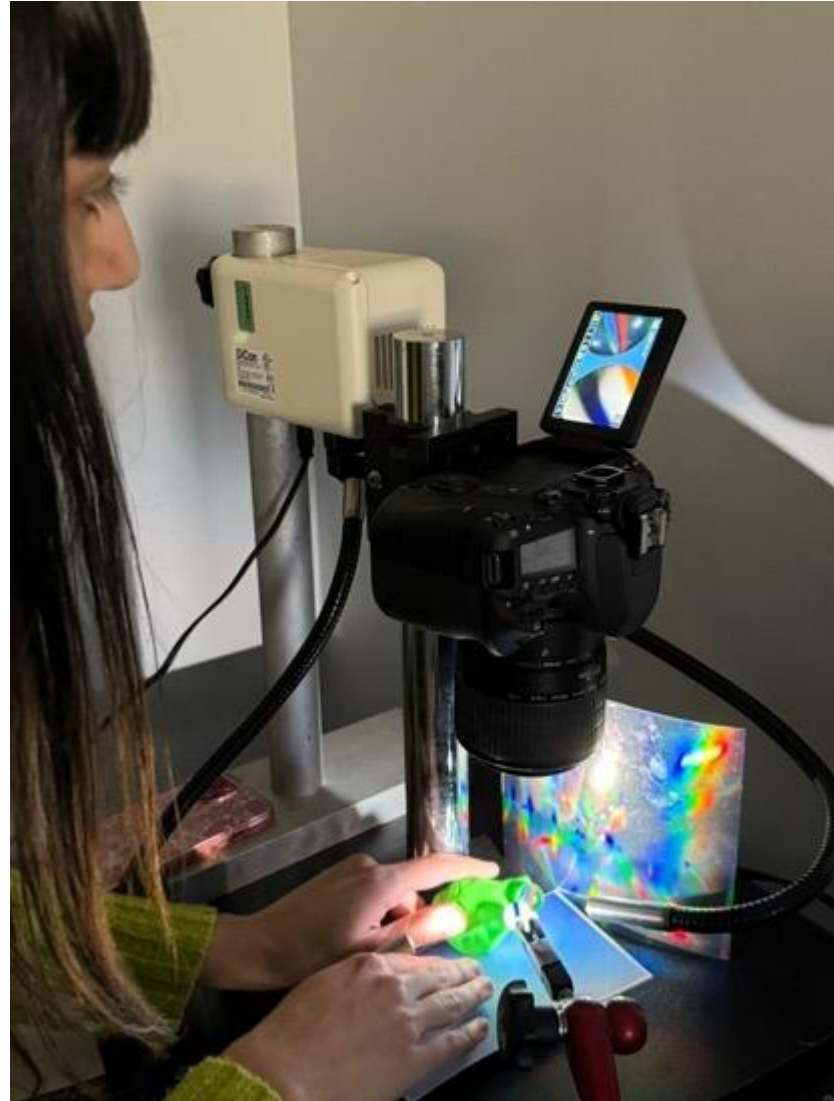


## LANL

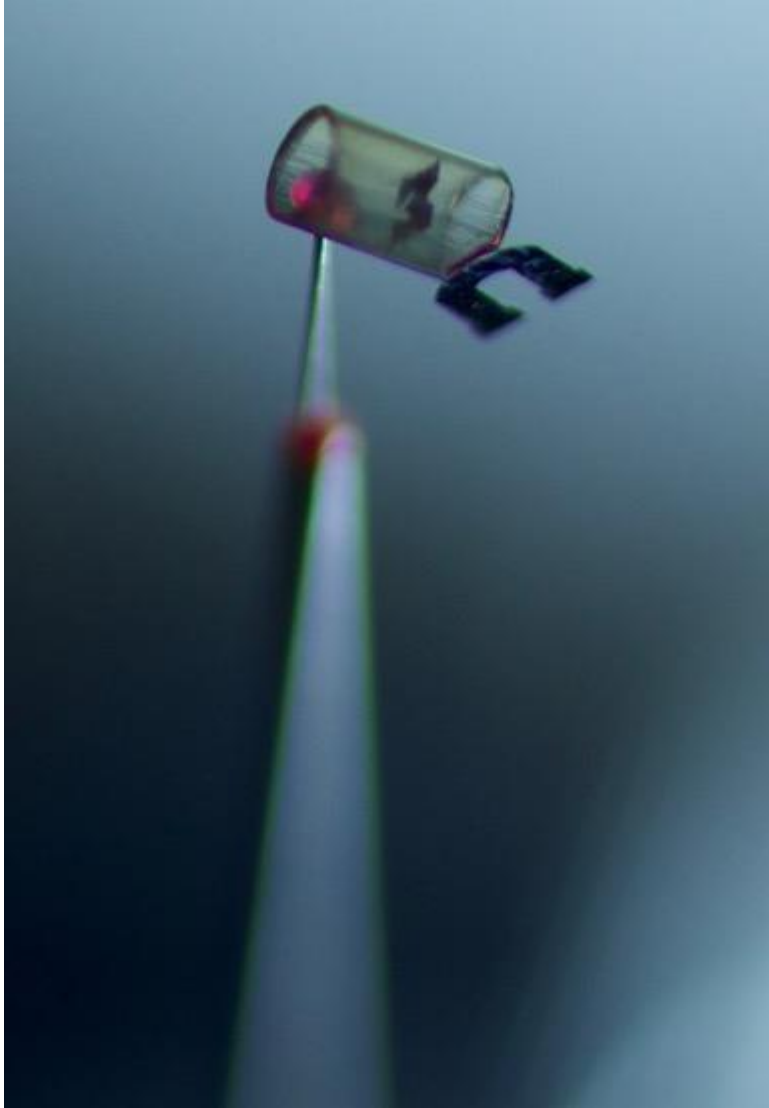
- presented their work
- toured target fabrication
- met key scientists

- LANL
- DPP
- LaserNetUS





# Follow Us!



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