2D Spatially and Spectrally Resolved Imaging Using Spherical Crystal for Structured Targets

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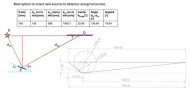
ABOUT ME

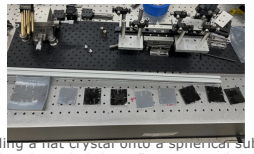
- Physics and Math major
- My goal is to use physics to create cures to diseases that currently do not have one. Although my goal corresponds with medical physics I am interested in many different fields of physics such as plasma physics which is the the field I do the most research in currently
- My interests outside the lab include trying new food places as well as exploring nature.
- I chose to have a fellowship at LLNL because of the great things I have heard and researched about the lab. This is a place that allows you fully immerse yourself in your research and I admire that and would love to be apart of it.

SUMMER RESEARCH

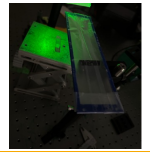
Objective
- Design and develop a spherical crystal spectrometer which provides energy dispersion along one axis and spatial resolution along another.
- 3d print and polish crystal substrates for crystal adhesion
- Continue implementation of spectrometer for use in ongoing campaign at JLF Titan laser

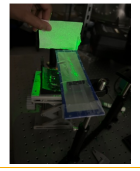


Method
- The target radius of curvature for the Mica crystal was constrained by the spatial limits of the target chamber, the mechanical feasibility of spherical bending and requirement for the optimized magnification
- Geometric angles were predetermined and fixed based on the necessary Bragg angles required for x-ray diagnostic
- Negative substrates with 120mm and 150mm radii were 3D printed with initial dimensions of 4x4x1 and polished to create a smooth contact surface
- To mitigate structural defects, the sample size was reduced to a smaller 2x2x1 Mica crystal while maintaining the 120mm and 150mm radii curvature



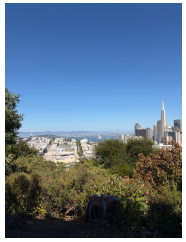
- Results
- We faced many challenges bending the crystal, bending a flat crystal onto a spherical substrate caused severe mechanical strain, resulting in micro cracks that degraded the reflectivity quality
- Cutting sections and thermal conditioning of the crystal reduced structural wear, although reflectivity was ultimately not achieved
- Slow curing epoxy prevented uniform crystal seating, which left air pockets trapped between the crystal and substrate, we used varying amounts of epoxy, tried thermal thinning of the epoxy and drilled holes in the substrate to allow the glue to seep through but were still unsuccessful





LLF AWARD

- My LLF funds were used to allow me to enjoy this internship to the fullest. I was able to try different food places, visit cities such as San Francisco and Oakland and explore surrounding nature areas.
- The reward also funded my transportation to the lab as well as groceries on a weekly basis.
- This fellowship has impacted me because it allowed me to gain resources that will help me throughout my career as a physicist. I have made connections as well as explored different areas of research that I would not have elsewhere.



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