



Fused Filament Fabrication in a Radiation Detection and Protection Makerspace

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Introduction and Motivation

- Campus-wide 3D printing resources have limited availability and may be costly
- Radiation detection and protection Makerspace available to students and staff
- Can equip the Makerspace with 3D printers, making the process more accessible and affordable for students and staff

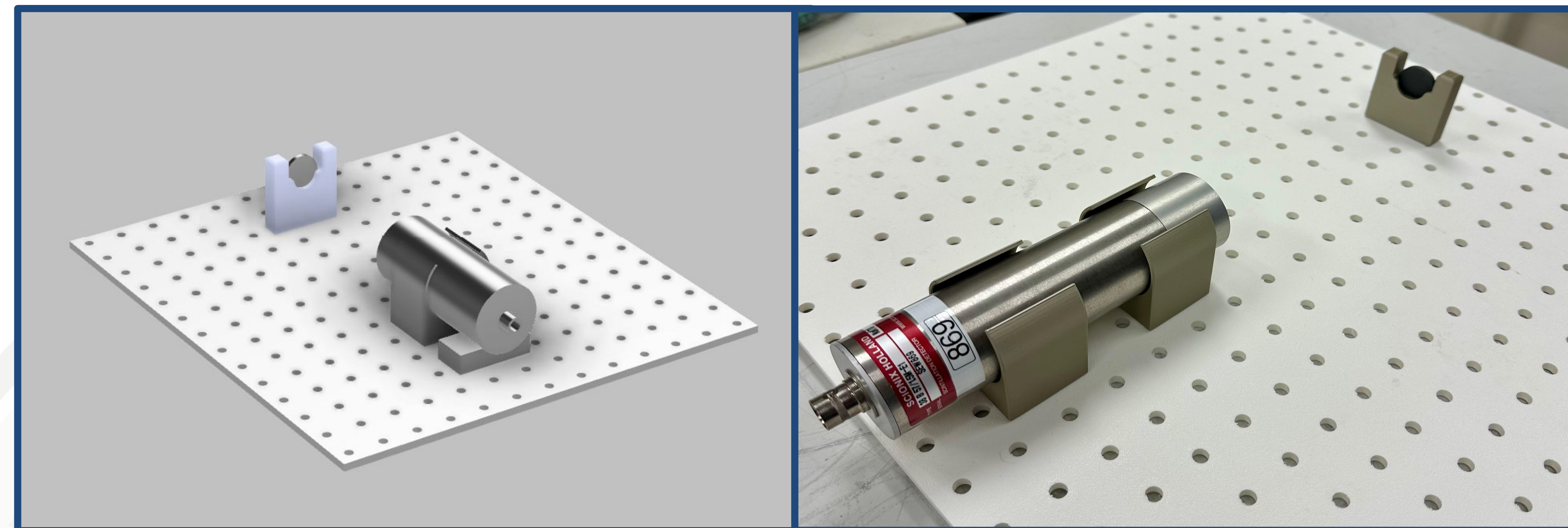


Technical Approach

- Directed undergraduate students in developing 3D printing products
- Nuclear research and educational assets printed with Bambu X-1 Carbon 3D Printers and accompanying Automatic Material System Units
- 3D models created with AutoDesk Fusion 360 and Solidworks
- Geometry converted for 3D printing using Bambu Studio slicer
- Overhangs, layer defects, and material adhesion tested using BenchyTheBoat and other common test prints.



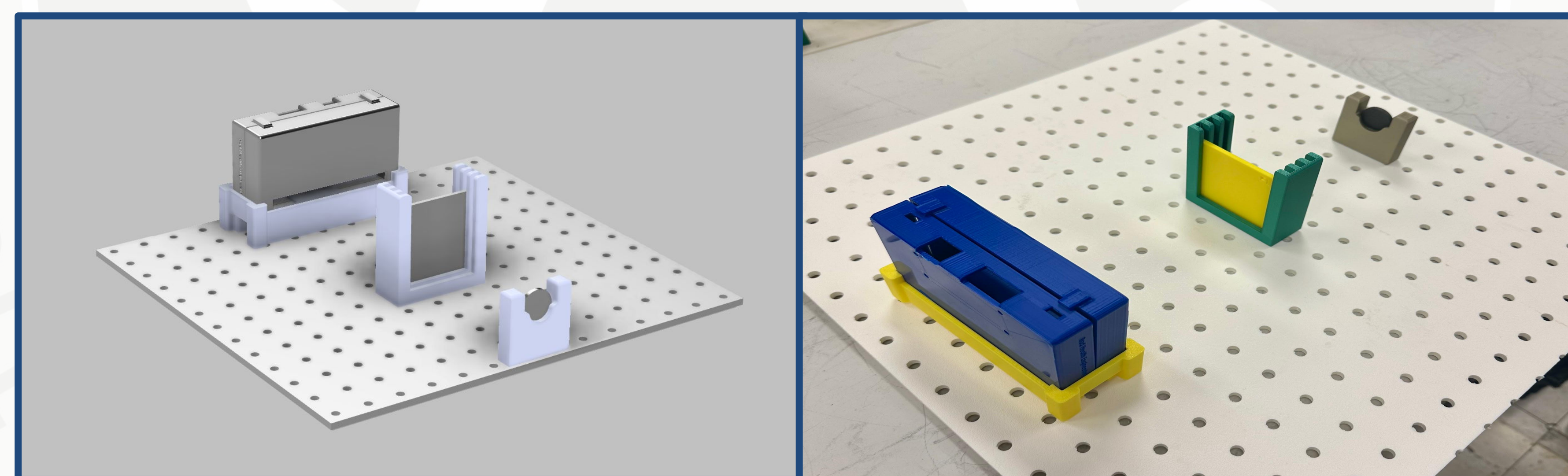
Results



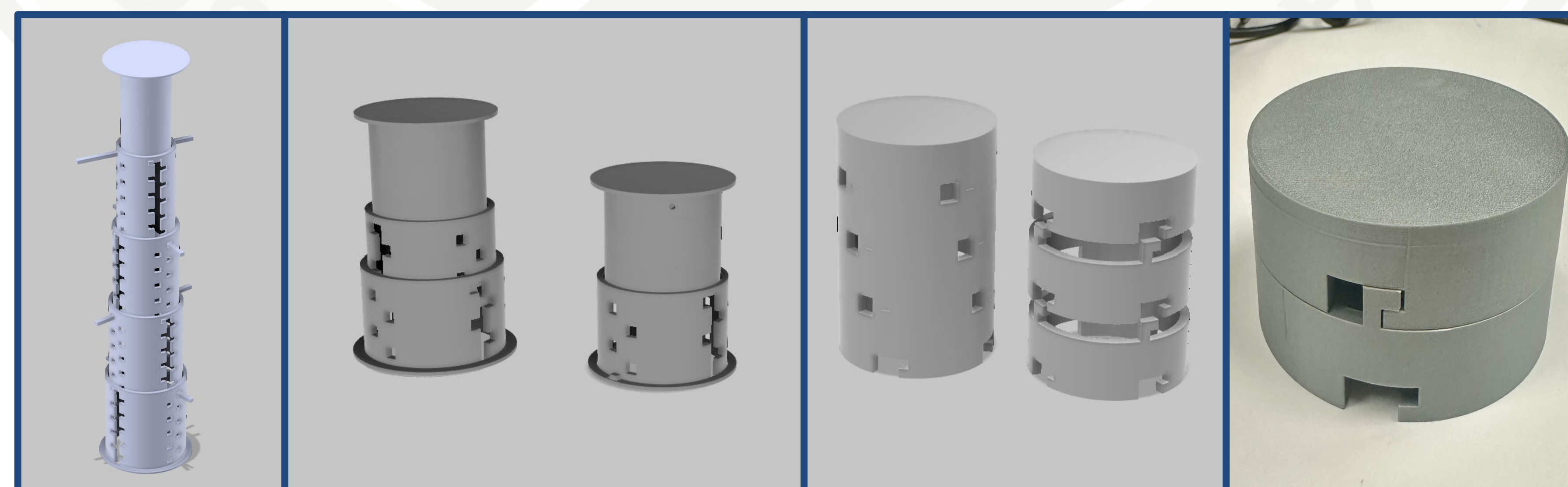
AutoDesk Fusion 360 rendering (left) and final fabrication (right) of experimental rig for holding point source and cylindrical detector, at fixed distances.



Design of Do-It-Yourself Geiger-Mueller Counter (DIYgm) and case.



AutoDesk Fusion 360 rendering (left) and final fabrication (right) of experimental rig for holding point source, absorbers, and DIYgm, at fixed distances.



Design iterations of a stand to support samples with different geometries inside a large volume well counter

Expected Impact

- Serve as an introduction to mechanical design for undergraduates
- Accelerate prototyping
- Support other research

MTV Impact

- Support for undergraduate students
- Undergraduate presentations
- Exposure to nuclear sciences for non-nuclear students

Conclusion

- More customizable and iterable experimental tools
- Experience in computer aided design and manufacturing
- Radiation detection research asset

Next Steps

- Make more widely available to courses and students
- Establish checkout procedures and prioritize jobs
- Expand outreach for middle and high school students

Mission Relevance

- Support nonproliferation research
- Build interdisciplinary teams
- Engaging outreach projects

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