

Overview of Laboratories and Capabilities

Yuguo Tao

2023 LANNS Symposium

May 12, 2023



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LABORATORY FOR ADVANCED NUCLEAR
NONPROLIFERATION AND SAFETY

Group Members

❖ Group Leader: Anna Erickson

*Associate Chair for Research and Woodruff Professor
Director, Consortium for Enabling Technologies and Innovation
G. W. Woodruff School of Mechanical Engineering
Daniel Guggenheim School of Aerospace Engineering (Courtesy Appointment)
Sam Nunn School of International Affairs (Courtesy Appointment)*



❖ Research Engineer:

Yuguo Tao, PhD



❖ Graduate Researchers

Alexander England
Caiser Bravo
Ian Schreider
Mackenzie Duce
Matthew Dunbrack
Natalie Cannon
Patience Yockey
Shae Cole



❖ Undergraduate Researchers

Anna Shafer
Gracie Eccleston
Jana Shade
Pierre O'Driscoll



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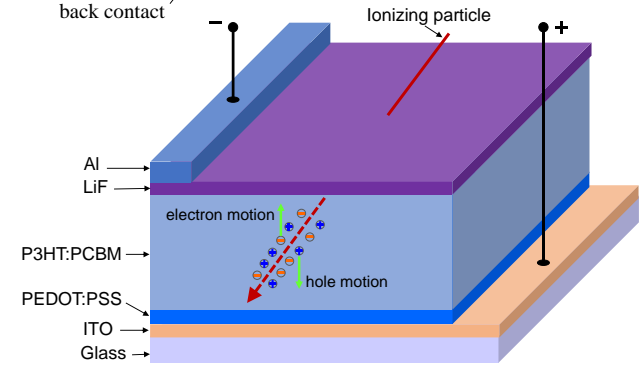
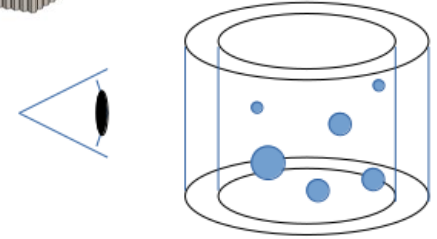
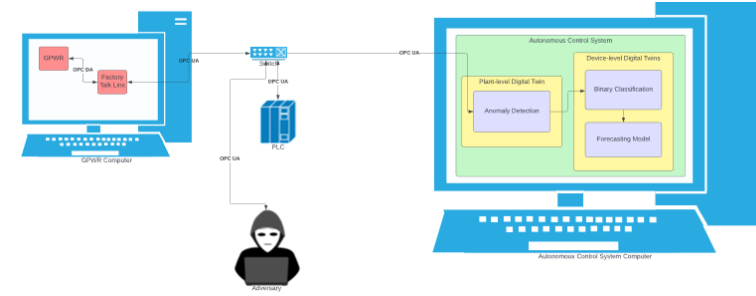
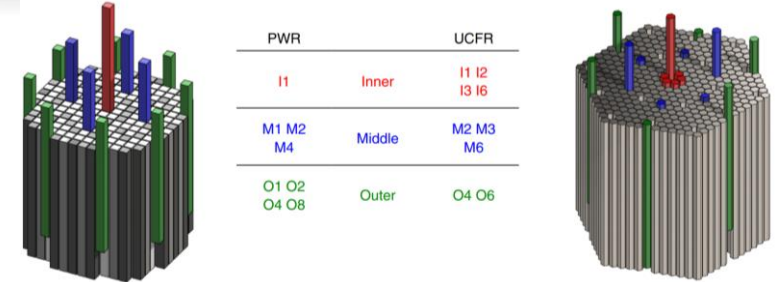
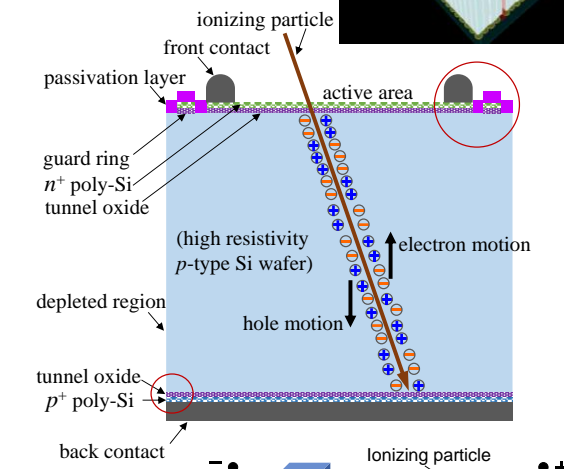
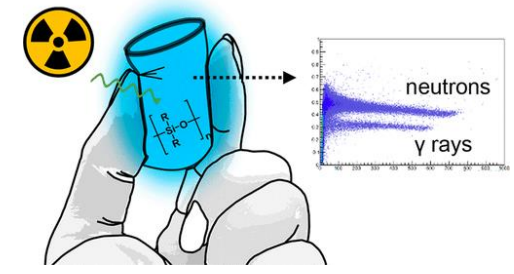
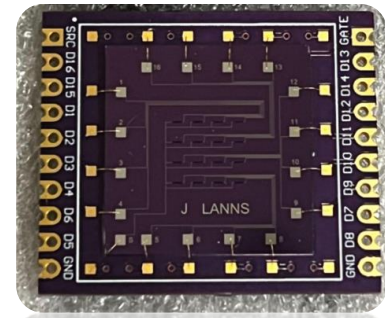
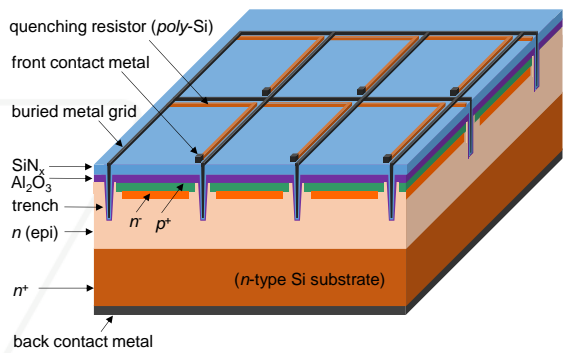
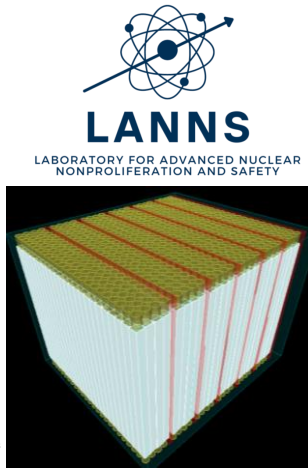
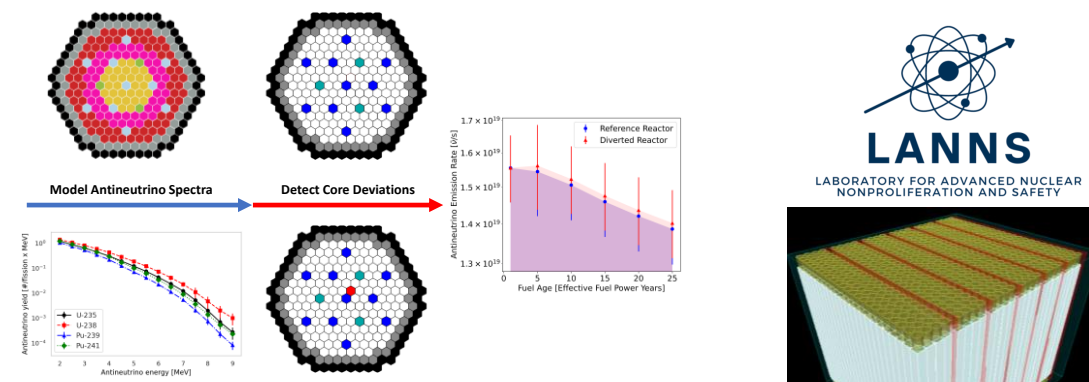
Main Areas of Our Research

❖ Next-generation reactor verification & safeguards

❖ Innovative radiation detectors & detector systems

❖ Advanced computational analysis & algorithms

❖ Advanced nuclear cybersecurity





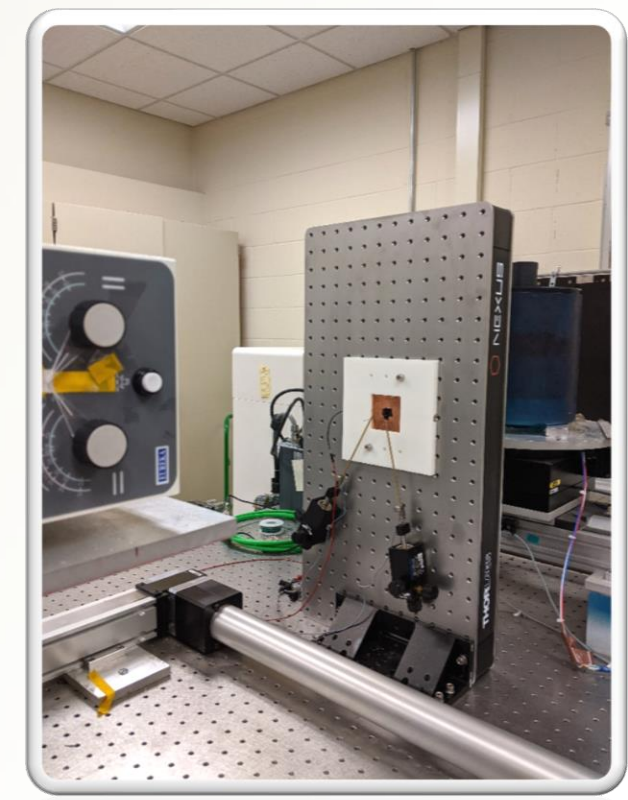
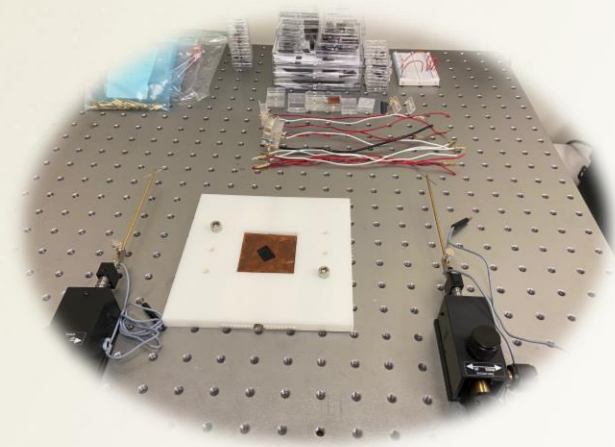
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LANNS Facilities: Boggs Building 3-19, 3-21

X-ray unit & probing station

To measure the current-voltage output of detectors (ie., carbon nanotube based detector) exposed to X-rays of various energies.



LANNS Facilities: Boggs Building 3-68

Building a new X-ray unit



LANNS Facilities: Boggs Building 3-36 (Shop)

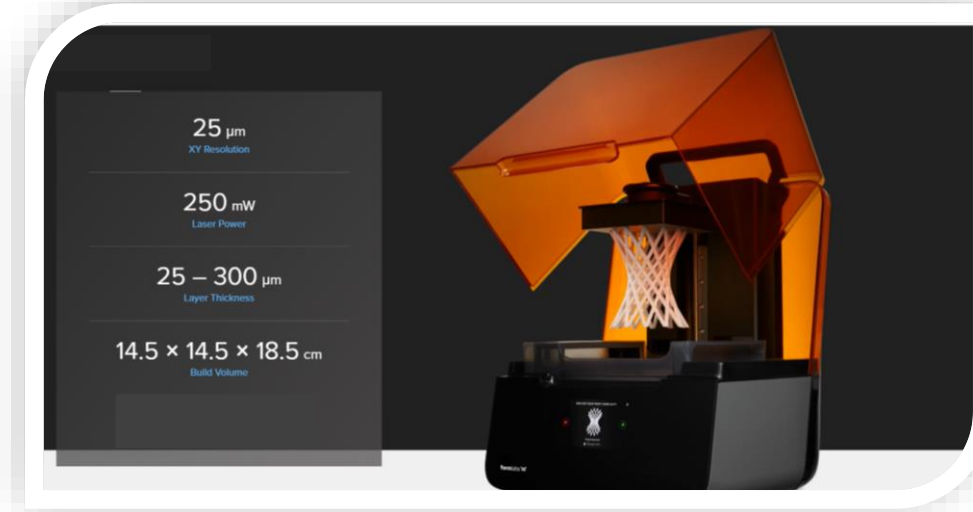


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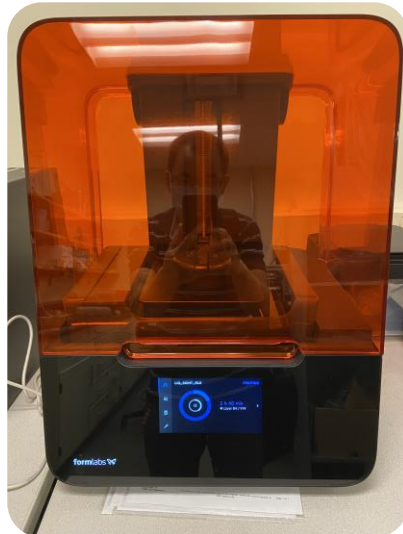
3D Printers

formlabs 

“The new Form 3 uses advanced Low Force Stereolithography (LFS) technology to deliver incredible print quality and printer reliability, with post-processing accessories cross-compatible with the Form 2.”



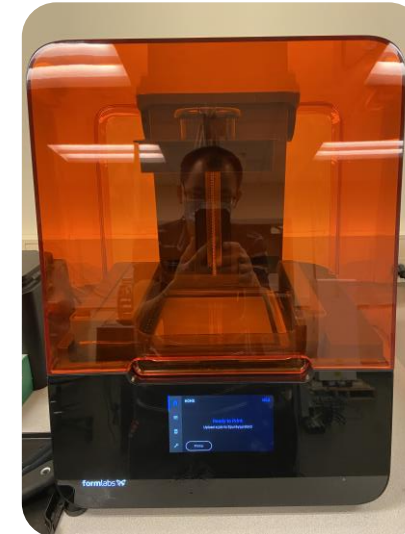
Form 3



Form 2



Form 3



LANNS Facilities: Boggs Building 3-12

- ❖ Fume hood

- ❖ Test station

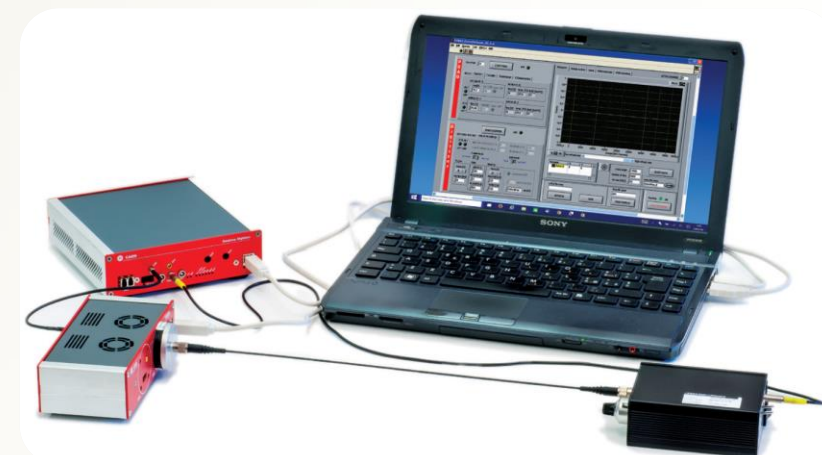
(ie., compare scintillator's performance via pulse shape discrimination)

- ❖ Wet bench

- ❖ Various radiation sources

- ❖ CAEN equipment (ie., digitizer)

- ❖ Detector system accessories

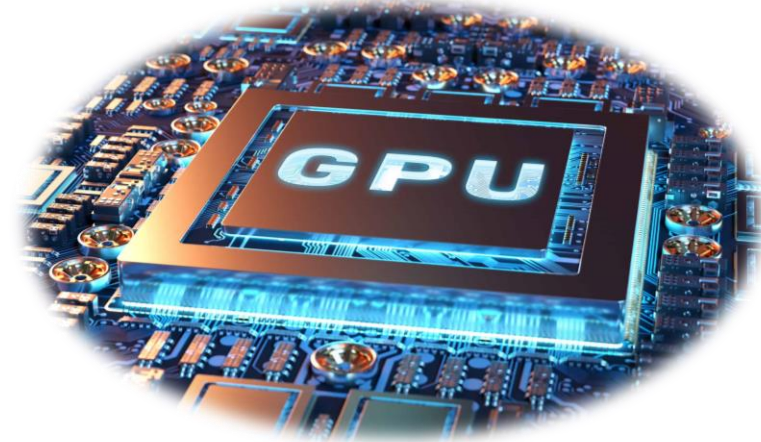


LANNS Facilities: High performance computing

Partnership for an Advanced Computing Environment (PACE)

Provides faculty participants a sustainable leading-edge high performance computing (HPC) infrastructure with technical support services.

- ❖ **768 GB compute node with single precision GPU**
-- machine learning/deep learning applications
- ❖ **2 x 384 GB compute node + 384 GB Compute node with local disk**
-- general MCNP/serpent work
- ❖ **Software: SERPENT, MCNP5, MCNP6, MURE**

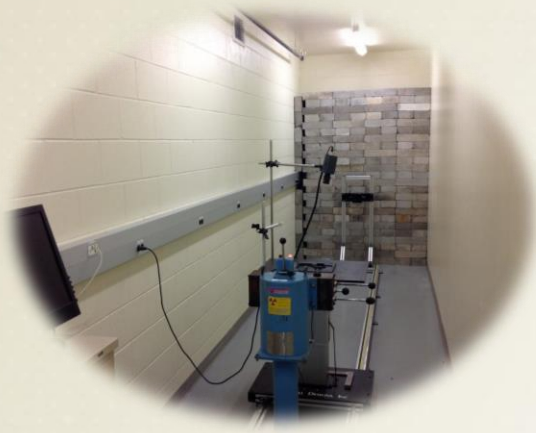


<https://pace.gatech.edu>

LANNS Facilities (accessible): RSEL Lab

Radiological Science and Engineering Laboratory (RSEL)

- ❖ Varian Clinical Linear Accelerator
- ❖ Radiation Physics Laboratory
- ❖ Neutron Generator Vault
- ❖ Calibration Lab
- ❖ Radioactive Sources



<https://www.rsel.gatech.edu>

LANNS Facilities (accessible): IEN cleanroom



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Institute for Electronics and Nanotechnology (IEN) Facilities

- ❖ **Lithography/Patterning:** UV Photolithography, Inkjet Printing
- ❖ **Etching:** Dry (reactive ion etcher), Wet (chemical solutions)
- ❖ **High Temperature Processes:** Oxidation, Annealing, Curing, Sintering
- ❖ **Thin Film Deposition:** Sputtering, Evaporation, ALD, PECVD, APCVD, LPCVD
- ❖ **Characterization:** SEM, TEM, Reflection, SIMS, IV Curve



GT Georgia
Tech.

<https://ien.gatech.edu>

Publications



Books and Book Chapters: **5**



Edited Volumes: **3**



Peer-reviewed Journal Publications: **42**



Conference Presentation with Proceedings : **25**



Conference and Invited Talks : **69**

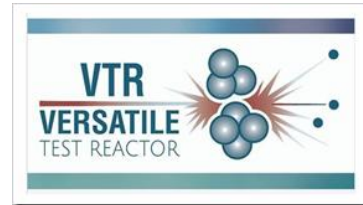


Poster Presentations: **10**



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Acknowledgement: our major sponsors



IEN Seed Grant



Thank you



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